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Piety, Politics, and the nebular hypothesis in the British Press 1844-1846

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Introduction

Although modern planetary formation theory differs significantly from nineteenth-century formulations, the core idea—that solar systems form from a collapsing cloud of self-gravitating, luminous matter—is now accepted scientific fact. First proposed by Immanuel Kant in 1755, the hypothesis gained empirical support when Sir William Herschel observed such clouds of "fire-mist" in the late eighteenth century. His son John continued this work by cataloguing nebulae (see Figure 4).

In 1844, the anonymously published Vestiges of the Natural History of Creation presented the nebular hypothesis in its opening chapter, using it as the foundation for a grand developmental narrative—the first attempt to "connect the natural sciences in a history of creation." Drawing on what had long been 'common knowledge' among astronomers and geologists, the author concludes that the hypothesis is "supported by so many ascertained features of the celestial scenery, and by so

many calculations of exact science, that it is impossible for a candid mind to refrain from giving it a cordial reception."

But Vestiges did not receive a cordial reception. Its sweeping evolutionary narrative—accounting for the transmutation of species and grounding morality in "the absolute identity of the brain with a galvanic battery"—proved too much for many Victorian readers. While the Examiner hailed it as "extraordinary," the Edinburgh Review complained that it "bound the Divinity in chains of fatalism," and the Waterford Chronicle denounced it as "audacious infidelity."

The press response to this work of popular science reveals how deeply the reception of a scientific hypothesis depends on its social context, and provides a compelling case study of both the public communication of science and the press's role in its diffusion [5]. Studies of science in popular contexts have emphasized that knowledge is not produced by scientists alone, but co-produced by authors, reviewers, and diverse publics [5], [6]. Vestiges offers a striking example of this process. Its sensational reception—across radical, religious, and establishment periodicals—shows how the nebular hypothesis was refracted through competing political and moral commitments. In this context, debates over cosmic origins became proxies for deeper anxieties about epistemic authority: who was entitled to produce, interpret, and disseminate scientific knowledge. What was at stake was not merely the structure of the solar system, but the moral order of society and the boundary between natural law and divine action.

The nebular hypothesis in Vestiges

Before turning to the commentaries, it is useful to outline the presentation of the nebular hypothesis in Vestiges (see Figure 1 and Figure 2). Herschel's observations of celestial objects with a "foggy appearance" are introduced early on (for John Herschel's depiction of a nebula, see Figure 4), and it is noted that these "exist in every stage of concentration," suggesting that they are "but stages in a progress," much as if, "seeing a child, a boy, a youth, a middle-aged, and an old man together, we might presume that the whole were only variations of one being." Chambers then adduces a series of empirical regularities in the solar system—concerning the distribution of angular momentum, as well as the relative distances and densities of the planets—which are taken to support the nebular hypothesis. Finally, he draws out a number of consequences, including the claim that "the Earth is older than Venus and Mercury, but younger than Mars, Jupiter, Saturn, and Uranus."

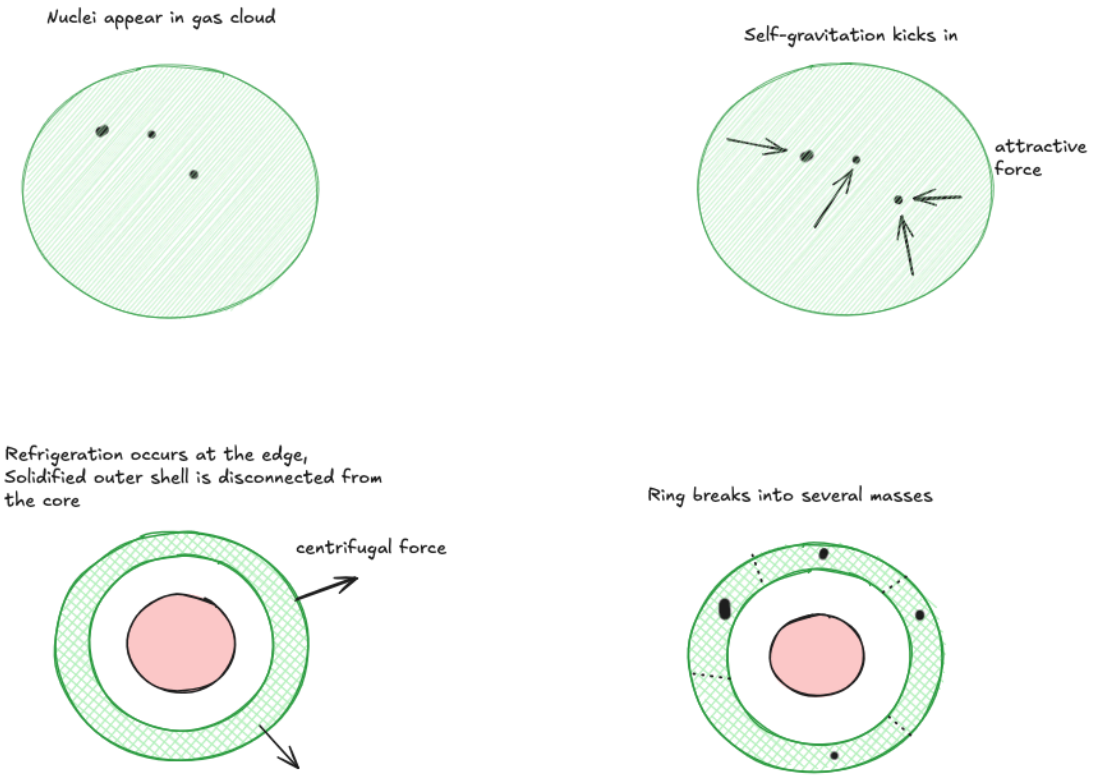

Figure 1: The nebular hypothesis (I): gravitational collapse of a luminous nebula into a central proto-sun through self-gravitation and centrifugal force.

Next, two competing visions of the current solar system are presented to the reader, both of which are framed as equally plausible given the available evidence. The first is a "completed" system, supported by "mathematical reasons [...] concluding that Mercury is the nearest planet to the sun, which can, according to the laws of the system, exist" [7, p. 6]. This is contrasted with celestial systems whose "formation [...] is still and at present in progress" [7, p. 21]. The alternative picture—a partially "incomplete" solar system—is grounded in the "comparative youth of our system," implying that it is "one whose various phenomena, physical and moral, as yet lay undeveloped, while myriads of others were fully fashioned and in complete arrangement." [7, p. 22]

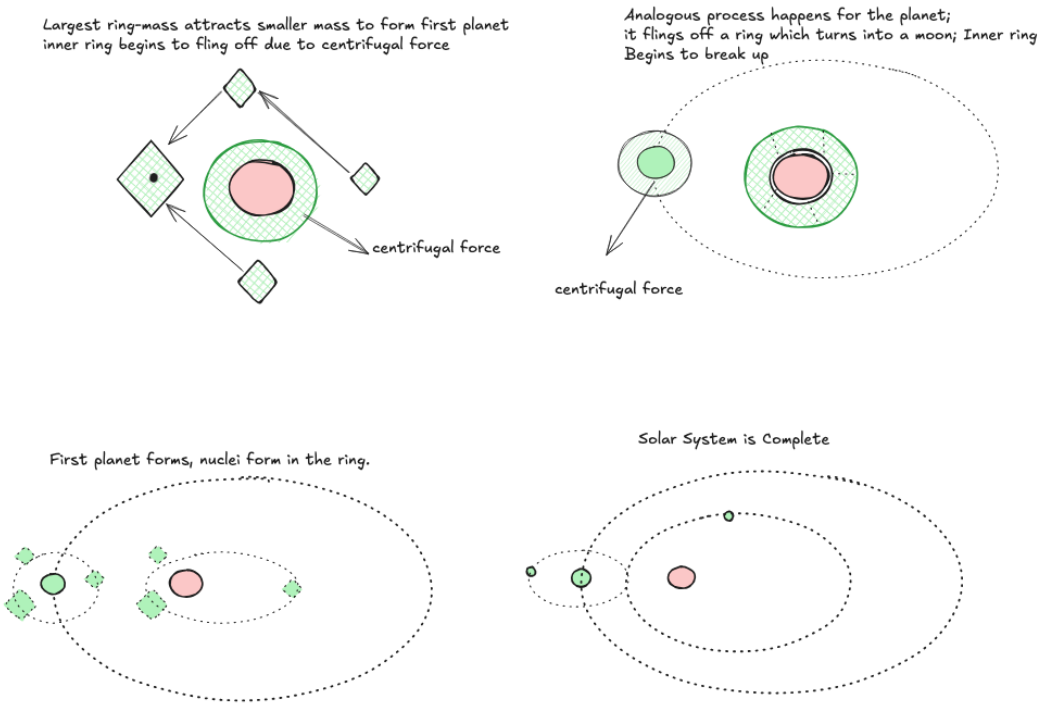

Figure 2: The nebular hypothesis (II): planetary formation through the detachment and condensation of rotating rings of matter.

1 The Radical *Examiner*: unfinished solar system, unfinished political progress

The first review of the *Vestiges* was an effusive eulogy in the London-based *Examiner*:

> In this small and unpretending volume we have found so many great results of knowledge and reflection, that we cannot too earnestly recommend it to the attention of thoughtful men.
>
> — *The Examiner*
> November 9th, 1844 [8]

Self-described as a "leading intellectual journal expounding radical principles" [9], the *Examiner* was read by an educated, well-to-do urban intellectual elite. It was politically active in the Reformist campaign that led to the expansion of the franchise in the Reform Act of 1832 [10], and dedicated ample space to celebrating various "death-blows" to Toryism in minor by-elections [11].

As we saw, *Vestiges* presents competing pictures of the solar system: the first is "completed", the second one "various phenomena, physical and moral, as yet lay undeveloped". The *Examiner* only presents up on the latter picture, adding that "there is evidence, altogether apart from human traditions" that there is much moral progress to be made in the "system". At times it is unclear whether "system" refers to the solar or political one.

The *Examiner* then continues to drive the point home that arguments from astronomy seem to herald great Progress around the corner:

> it is necessary to suppose that the present system is but a part of a whole, a stage in a Great Progress, and that the Redress is in reserve.

The *Examiner* thus sees the continual progress of our solar system to the present day with the continued moral and political battles being fought of the present day: Just as the work of radical reformers was not complete with the Reform Act, so too the Creator's work remained unfinished in the present state of the solar system.

2 The *Dublin Evening Post, Scottish Christian Instructor, & Waterford Chronicle*: wrongful accusations, fears of materialism, and the denigration of man

On 15 May 1845, John Pringle Nichol—clergyman, political economist, and author of the popular *Architecture of the Heavens* (1837)—opened the *Dublin Evening Post* to find himself accused of "infidelity, atheism, and materialism" [12]. The Post attributed the authorship of *Vestiges* to him, noting that "the paternity of the book was generally attributed to this gentleman." The suspicion was not arbitrary: as an astronomer who had already popularised the nebular hypothesis, Nichol was an obvious candidate, and the similarities between his account and that of Vestiges were widely remarked upon in the press, including by the *Liverpool Mercury* [13].

The misidentification is revealing. What had been an uncontroversial cosmological speculation in 1837 had, by 1844, become inseparable from accusations of irreligion once embedded in the broader developmental programme of *Vestiges*. Nichol moved quickly to clear his name, denying authorship in a letter to the editor while pointedly refusing to comment on "the justice or injustice" of the charges. The Post subsequently issued an apology, but Nichol's caution is itself telling: even denial required careful calibration, as public engagement risked reputational damage.

The very concept of 'sin' is predicated on free will. Yet Vestiges proposes "the absolute identity of the brain with a galvanic battery", prompting the Waterford Chronicle to complain that it was "reducing morality to a mechanical process" [14]. The Scottish Christian Instructor similarly warned that the work aimed "to do damage to the moral constitution of man" [15], depicting humanity as "nothing else but the earthly descendant of a cyclo-neura… or a snail." For its critics, the nebular hypothesis functioned as the first step in a chain of "gross materialism" that displaced a providential order in which "all manifestations of nature" expressed "a relationship between God and Man" [16].

As we shall see, secular papers such as the Atlas and Liverpool Mercury also treated Vestiges as morally consequential, but tended to displace concern from human moral agency onto questions of divine dignity—asking whether the system "exalts our idea of God" rather than whether it undermines human responsibility [17]. The secular press may therefore have avoided sustained engagement with clerical arguments about free will because this was precisely where the theological critique was most difficult to answer. The relationship between atheism and moral objectivity remains contested in contemporary philosophy, with some defending secular moral realism [18], others grounding morality in theism [19], and others rejecting objective morality altogether [20]. Within the constraints of the periodical press, such foundational questions could be raised, but not easily resolved.

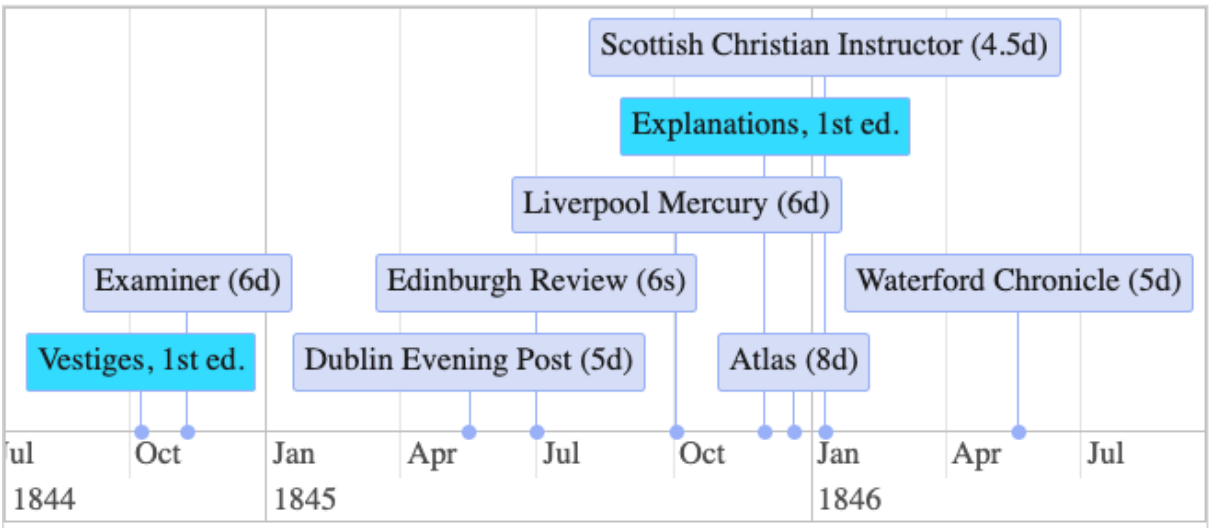

Figure 3: Publication timeline of the articles discussed; prices included where available

3 The authoritative *Edinburgh Review* declares open war on the book, reasserting the boundaries of 'respectable science' and its popularization

The *Edinburgh Review* was a pioneer of steam printing in the early 1800s, becoming one of the most influential periodicals of the age [21]. As a Quarterly publication it was expensive, (at 6s), extensive (some reviews could reach 80 pages) and authoritative, defining the long-term fate of books [22]. It supported Whig politics, but was less radical than the *Examiner*. Among its subscribers was Adam Sedgwick, a prominent geologist, Anglican priest, and mentor to Charles Darwin.

Sedgwick had strong feelings about the book, hoping that a review would stamp "with an iron heel upon the head of the filthy abortion, and put an end to its crawlings" [22]. When approached by the *Edinburgh Review*, he obliged with a lengthy and unrelenting rebuttal that lived up to the magazine's nickname, "The Thunderer":

> The world cannot bear to be turned upside down; and we are ready to wage an internecine war with any violation of our modest principles and manners
>
> — *Edinburgh Review*, July 1845 [23]

James Secord has argued that for Sedgwick, the book's popularity threatened to provoke an anti-science conservative counterreaction from the "Tory diehards" within the Church [22]. After all, geologists like Sedgwick were making discoveries that threatened a literal interpretation of Genesis [24]. The *Liverpool Mercury* would later pick up on this tension, explaining Sedgwick's ire by the fact that the Dean of York had unfairly heaped charges of "infidelity and materialism, [...] on his favorite pursuit, Geology" [13]. Perhaps, the *Mercury* mused, a "mere anonymous bookmaker might well be sacrificed to evidence the orthodoxy of a Cambridge divine".

Thus, Sedgwick felt it necessary to distance the respectable, gentlemanly scientific establishment from the work, emphasising that "no man who has any name in science, properly so called, whether derived from profound study, or original labour in the field, has spoken well of the book".

Whereas *Vestiges* presents the nebular hypothesis as an "ascertained truth", to the *Edinburgh Review* it was merely "a splendid vision". It is not dismissed as untrue as much as unfounded: "after five hundred years of continued observation [it] *may* pass into a substantial theory". The failure to account for the large amount of angular momentum in the solar system constitutes, for Sedgwick, the anonymous author's "first great blunder" [25].

But Sedgwick was not merely worried about being misunderstood by Tory diehards and Christian fundamentalists. He understood as well as they did that science was "the most potent instrument of persuasion in our culture" [26], and was therefore worried that people like Chambers, who had mastered the conventions of gentlemanly writing, can masquerade as credible authors and lead the public down the dangerous conclusions inferred from its "degrading materialism". This public is portrayed as gullible, "men who are fed on nothing but the trash of literature" - and since they "are not able to judge from their own knowledge, [they] must therefore be plainly told" that *Vestiges* is not real science. We must protect "our glorious maidens" from books that "teach that their Bible is a fable when it teaches them that they were made in the image of God - that they are the children of Apes and the breeders of monsters", or that he has "annulled all distinction between physical and moral" [23, p. 3].

Sedgwick warns that materialism, if taken up by the working classes, would bring "ruin and confusion," "undermine the whole moral and social fabric," and introduce "discord and deadly mischief in its train." The fear of a French-style revolution is palpable.

To Sedgwick, "religious revival should go hand in hand with the diffusion of knowledge from *credible sources*" [22]. He therefore makes a point to state not only who is allowed to do science and how, but also who should be allowed to communicate this to the public. People who have not learned the lessons of "humility" from "their own repeated failures", who have not "learned to appreciate the enormous and continued labour by which every new position has been won", should not be allowed to "toss their fantastical crudities before the public" [25, p. 4]. True science is cautious and manly ("ill-fitted for the drapery of a petticoat" [25, p. 3]). Only men who have experience walking the "rugged and thorny road of science" have the humility requisite to communicate science to the public.

Gillian Beer argues that Adam Sedgwick's attack left a lasting impression on his former pupil, Charles Darwin [16]. Although Darwin had largely formulated his theory of evolution by natural selection by 1844, the critique appears to have prompted him to undertake more rigorous inductive work to fortify his theory, including his eight-year study of barnacles.

4 The Dissenting *Liverpool Mercury* lampoons the 'Cambridge Schoolmen'

We now turn to the voice of the industrial English North: the *Liverpool Mercury* originated in Liverpool was an upbeat "provincial" paper, read by the up-and-coming northern merchants and shopkeepers riding the wave of the industrial revolution [27]. A huge portion of the Northern middle class were Dissenters - Baptists, Methodists, and Unitarians - barred from taking degrees at Oxford and Cambridge, and were thus anxious for social reform much like the readership of the *Examiner*. The *Mercury*'s motto, *Salus Populi Lex Suprema*[1], revealed their founders' long-term aim as 'continual and peaceful progress'. It was a staunch campaigning newspaper fighting for better housing and public health in Liverpool [28]. It was just as radical as the *Examiner*, but its focus was less on literature than commerce and politics, and of course, the interests of the North. The

[1]The welfare of the people is the supreme law

newspaper therefore is likely to have been read by middle-class and reform-minded Dissenters, interested in social improvement and progressive politics and eager for reform. These are the men and women that Sedgwick surmised were "fed on nothing but the trash of literature".

In contrast to the *Post* and the *Edinburgh*, who reacted with "deep odium" to the "degrading materialism" of the work, the *Mercury* is positive, although it stops well short of the *Examiner's* earnest and effusive praise. Instead, the *Mercury* approves of the spirit of the "much-abused little book", calling its attention "well-deserved". It expresses "regret" that the "speculative opinions hazarded by the author [...] should have been met in such an intolerant spirit". In effect, the *Mercury* provides a tongue-in-cheek 'review-of-the-review', sarcastically undermining Adam Sedgwick's critical hit-piece in the *Edinburgh*:

> It is, however, not a little curious, that while the nebular theory was locked up from vulgar eyes in the iron-bound casket of the *Philosophical Transactions*, it was held as a talismanic gem of the first water [...] But no sooner had Nichol[2], with more of zeal for popular information than proper veneration for philosophical profundity, transferred it, brilliantly re-set, to his pert little duodecimo, than it was discovered that the gem contained some flaws [...] But now that the author of the "Vestiges," in his turn, has taken it, cut and dry, from Nichol [...] to make it work out its seeming destiny in his own pages, it is discovered to be mere paste after all.
>
> — *Liverpool Mercury*,
> Friday, 17 October 1845 [13]

Thus the *Post* cleverly emphasizes the *lack of controversy* surrounding the nebular hypothesis in 1837, to reveal the hypocrisy of "our philosophers". When the hypothesis is presented in a popularized form to "our readers, the reading and thinking public", the "Cambridge schoolmen" change their mind about it.

Many of the readers of the *Mercury* were newly wealthy and well-read but institutionally barred from participating in professional science due to their religious convictions. Therefore the readership of the Mercury is likely to have admired and identified with the anonymous author of the *Vestiges*, who is clearly well-read and educated, though lacking in first-hand scientific experience. Why shouldn't these upstarts be allowed to speculate on the origin and fate of the Universe?

The *Mercury* then mocks Sedwick's absurd "theory-phobia":

> If Columbus had published his Theory of the Discovery of America in a pamphlet, the Rev. Professor would have demolished it in a good set speech, [...] and would [...] have blandly told him [...] that he had no "right to toss out his fantastical crudities before the public, and give himself the airs of a legislator over the material world."
>
> — *Liverpool Mercury*,
> Friday, 17 October 1845 [13]

What appear to the *Mercury* as "harmless, really inoffensive speculations", Sedgwick says are at "open war with all the calm lessons of inductive truth". In other words, the Cambridge "philosophers" were being pedantic. For the *Mercury*'s commercially-minded readership, a theory was more akin to a business plan: You need one to move forward, even if imperfect. For Sedgwick, a theory could only be won by "enormous and continued labor". The *Mercury* similarly mocks Sedgwick's cry of "degrading materialism":

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[2] John Pringle Nichol, astronomer and popular author, author of the *Architecture of the Heavens*, 1837 [29]

> In polemics or criticism nothing can be more unfair than to raise the hue and cry of materialism. It implies, not seldom, a lack of sounder argument in those having recourse to it,
>
> — *Liverpool Mercury*,
> Friday, 17 October 1845 [13]

Thus, the *Mercury* understandably refracts the nebular hypothesis through the prism of class warfare: Just like the Reform Act of 1832 had wrested power from the entrenched "Old Blood" of the English southern aristocracy, the same battle lines are drawn in the reception of this book. Their "internecine war" declared against the nebular hypothesis reveals the schoolmen's hidden agenda: to restrict the "narrow and thorny entrance through which we may lawfully approach" natural science and ban outsiders from "tossing out fantastical crudities" before the public.

5 The Sophisticated *Atlas*' critical but even-handed commentary legitimates the *Vestiges* in polite society.

The anonymous author absorbed the reaction to his book and published several further editions as well as a sequel, *Explanations*, published in December 1845. Mirroring the approach in the *Liverpool Mercury*, the author quotes the gentleman scientists' words back at them: showing that they had privately agreed to theories that they were now vehemently opposing.

The *Vestiges* and *Explanations* were jointly reviewed in late 1845 in the *Atlas* [17]. A self-styled "Journal of Literature", it was London's most expensive weekly, costing 8 pence. The *Atlas* shared the *Examiner*'s Liberal-Whig sympathies but it kept its distance from the fray of everyday politics and adopted a highbrow and philosophical tone.

The key empirical difficulty with the nebular hypothesis, according to the *Atlas*, is the fact that Lord Rosse's *Leviathan* telescope had managed to show that many nebulae were actually collections of stars, not clouds of gas. The cultural uproar against an evolutionary universe had sparked renewed interest in reproducing the observations by Sir William and John Herschel ([30]). William Parsons, 3rd Earl of Rosse spearheaded the construction of the largest telescope ever built, now known as the *Leviathan of Parsonstown*, in Birr, in rural Ireland [31].

Early results from the *Leviathan* seemed to undermine the nebular hypothesis, as the Earl confirmed that he could resolve the Orion nebula (see Figure 4) into individual stars. This was probably due to confirmation bias: spectroscopic measurements in the 1860s concluded that *Orion* really was a cloud of luminous dust [31]. Today, the Leviathan is mainly remembered for the discovery of galaxies beyond our own (for example, the M51 in Figure 7), massively increasing our conception of the size of the known universe [31] .

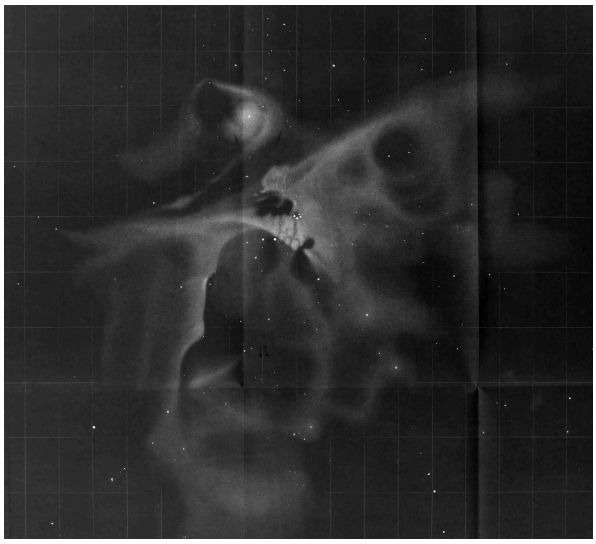

Figure 4: John Herschel's, *Orion Nebula Drawing*, 1835 [1, p. 508]. Lord Rosse believed that his *Leviathan* (Figure 6) could resolve it into individual stars.

Figure 5: The Orion Nebula photographed in 1883 [2]

Figure 6: Leviathan of Parsonstown. Working Men's Educational Union, 1853 [3]

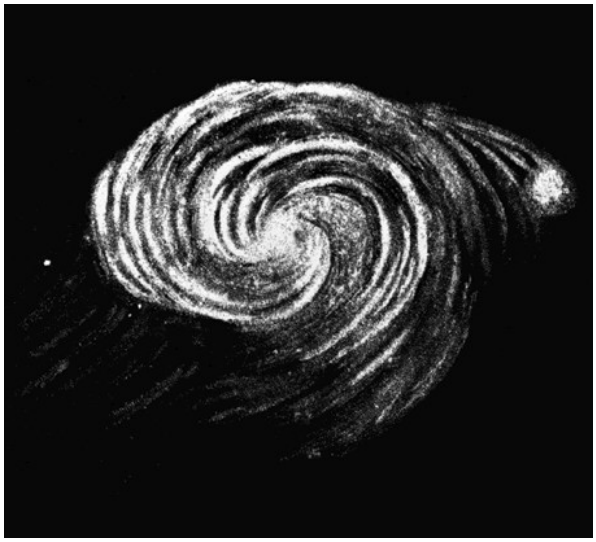

Figure 7: Whirlpool Galaxy. 1845 sketch made by William Parsons, 3rd Earl of Rosse [4]. via Wikimedia Commons

The *Atlas* then turns to the bearings of the theory on God, an area where "popular feelings are likely to be most deeply interested". First, where does this theory leave individual acts of God? Second, what does it imply for our "estimate of the Divine character"? On the first question, it notes that "there are names of no mean repute who would reserve certain domains of creation as the fields of special interventions". On the second question, *Explanations* appeals to the 18th century Nonconformist minister Phillip Doddridge:

> "No, there is nothing atheistic, nothing irreligious, in the attempt to conceive creation, as well as reproduction, carried on by universal laws".
>
> — Rev. Phillip Doddridge, as quoted in [17]

The *Atlas* review was critical but measured. The *Vestiges* is referred to as a "Frankenstein", but the criticisms of "scientific caution" and "theory phobia" of the *Liverpool Mercury* are restated with more detachment:

> Modern teachers had been used so long to the Baconian go-cart, that they had become [...] apprehensive of losing the inductive clue [...] But the time had arrived [...] to relax the strictness of the investigative rule, and afford scope for a more systematic, if not speculative research.
>
> — *The Atlas*, 20 December 1845

In the "Historical Sketch" of the 1859 Origin of Species, Charles Darwin would acknowledge *Vestiges* for its role in "removing prejudice" and "preparing the ground" for his own theory [32]. I would argue that the *Atlas* review, being neither overtly political like the *Examiner*, nor heavy-handed like the *Edinburgh*, but measured and philosophical, imprinted these discussions with a mainstream propriety that had been lacking so far. It was no longer a matter simply astronomy enthusiasts, political radicals, the crusading clergy, or gentleman scientists, but it was now a reasonable topic of conversation by pretty much anyone in clined to have a modish chat. The *Atlas* review then marks the desensitization of the Victorian middle classes to the shock of the moral implications of a materialistic, law-governed universe. Sedgwick's "filthy abortion" had been transformed into a legitimate, even sophisticated topic of conversation [17].

Conclusion

We have seen how a range of publics—Whigs and Tories, Radicals and Dissenters, Catholics and Protestants, Cambridge scientists and Northern industrialists—refracted the debate over the origin of the solar system through distinct political agendas and moral commitments. Our analysis echoes Bensaude-Vincent's argument that, in studies of science popularization, the generic term "public" is better replaced by the political category of "citizens," understood as a "variety of motivated individuals or informed groups, acting as responsible actors and members of civil society" [33].

To the *Examiner*, the morally uncompleted solar system reflects the moral and political battles that have yet to be won against the Tories. To the *Liverpool Mercury*, the extreme reaction from the 'Cambridge schoolmen' betrayed their elitist attitudes and unfair gatekeeping. The *Edinburgh Review* reveals the fear of a "French-revolution"-style moral collapse, and a battle over who is allowed to participate in and communicate scientific discoveries. Finally, the religious press, in the *Dublin Post*, *Scottish Christian Inquirer*, and *Waterford Chronicle* shows that pious Catholics and Protestants were more concerned by the implications of materialistic natural law on the dignity of *man* than on our conception of *god*, a concern that the secular press like the *Atlas* and *Examiner* either deflected or left unaddressed.

The fierce debate led to the publication of 14 heavily revised subsequent editions, and a sequel, *Explanations*, which incorporated and responded to many of the criticisms in the press [22]. This iterative process of production, incorporating what historian Natalie Zemon Davis has called "the creative competence of the lower orders" is a testament to the co-production of the work of popular science.

This co-production performed essential cultural labor, leaving a mark on Victorian scientific and political discourse for decades to come: Darwin reflected in 1871 that *Vestiges* "has done excellent service in this country in calling attention to the subject, in removing prejudice, and in thus preparing the ground for the reception of analogous views". [32].

The outcry over Vestiges encouraged Darwin to take a more cautious, inductive approach and contributed to the broader context in which the construction of the Leviathan of Parsonstown (Figure 6) took place, suggesting that the scientific endeavour was shaped by newspaper readers and anonymous reviewers as much as by elite scientists.

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