

Ocean Growing: Blake's Two Versions of *Newton* and the Emerging Polypus

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I.

1 **B**LAKE printed the *Newton* large color print three times, twice in 1795 (first and second pulls) and once in 1804–05. The dating of the final impression is owing to Martin Butlin's discovery of an 1804 watermark on this print, a finding published in his 1981 article "A Newly Discovered Watermark and a Visionary's Way with His Dates."¹ One of the two 1795 impressions is untraced, leaving two of the three extant: one from 1795 (illus. 1) and one from 1804–05 (illus. 2).² *Newton* is part of the series of twelve large color prints centered, according to the editors of the *William Blake Archive*, "upon images of the fallen world." The 1804–05 impression, which features the naked natural philosopher contracted and applying dividers to a mathematical design while seated on what appears to be a coral reef on the ocean bottom, certainly adheres to this theme. In this fallen world, one cannot fall any lower than the sea floor. The mysterious image invites interpretation, especially given Newton's prominence as a target—along with Bacon and Locke—insofar as he represents limited imaginative vision and a mechanistic metaphysics through-

1. The other design reprinted in 1804–05 is *Nebuchadnezzar*; he, like Newton, appears in a contracted, fallen position. I am grateful to Joseph Viscomi for generously sharing information concerning the dates of the three printing sessions for *Newton* from a manuscript for a forthcoming book; he argues that *Nebuchadnezzar* was reprinted twice c. 1804–05.

2. Butlin acknowledges that there may have been a third printing (*Paintings and Drawings* no. 307), and Viscomi argues for the untraced 1795 impression based on evidence of a second printing during that year.

out Blake's poetry.³ David Bindman, for instance, reads the print as representing "the triumph of Science and Natural Religion in the 18th century" (*Graphic Works* 477).

- 2 No interpretation, however, has discussed the marked differences between the two prints of *Newton*: the 1795 version portrays Newton sitting in the same hunched posture on a very dissimilar rock formation, the surface of which—with the exception of some patches of burnt orange and blue—is largely bare, like his own body.⁴ He seems meant to be associated with the rock on which he sits, emphasizing Blake's view that the laws of Newtonian physics had fixed the world in Urizenic petrification, as later stated in *A Descriptive Catalogue*: "The Horse of Intellect is leaping from the cliffs of Memory and Reasoning; it is a barren Rock: it is also called the Barren Waste of Locke and Newton" (E 546).⁵
- 3 In the 1804–05 print the rock is teeming with life, as if a coral population of sponges and spiky urchins had proliferated on the work in the intervening ten years. The richly textured and finely articulated coralline forms result from Blake's method of color printing, which Viscomi has described as "printing wet paint from flat millboards or relief plates onto large sheets of paper." The printed paint could be left in its "accidental" spongy state (closely resembling the rough texture of a coral reef), which Blake could choose to refine by washing over the printed colors in watercolors

3. An early instance occurs in pl. 4 of *The Song of Los* (1795), when Urizen, weeping, hands the "Philosophy of Five Senses" to Newton and Locke (E 68).

4. Butlin writes that the inscription "NEWTON" that appears on the rock in the 1795 print "is totally uncharacteristic of Blake's hand and would seem to be some later restorer's imaginative reconstruction of some worn pen drawing indicating texture on the rocks to the left of the protagonist" ("Physicality" 17). In his catalogue raisonné, he provides a clue as to why a restorer or owner might have written Newton's name on the design: the print was sold as "Archimedes" in the Hogarth sale of 1854 (p. 167). Since Blake inscribed "Newton" below the design of the 1804–05 print (166), the text on the 1795 print might have been an attempt to rectify the misidentification of Newton as Archimedes. I am grateful to Robert Essick for informing me that the 1795 print was sold on 11 Dec. 1865 by the estate of Samuel Prince for £5.10s. to Halstead (Butlin indicates this sale as well, p. 167) and that it was titled "Newton" and described as "a fine fresco drawing in colours, signed by the artist" (Blake signed the print "Fresco W Blake inv"). Thus, at least by 1865, the figure in the 1795 print was correctly identified as Newton. William Michael Rossetti's catalogue raisonné, included in Alexander Gilchrist's 1863 biography of Blake, identifies the 1804–05 print (owned by Butts) as *Newton* (2: 203), but makes no mention of another extant print. Rossetti lists "Archimedes" (2: 250) in Blake's "Uncoloured Works"; Butlin suggests that this is a reference to the pencil sketch for *Newton* (*Paintings and Drawings* no. 308) or a confusion with the 1795 color print.

5. Jean H. Hagstrum connects the *Newton* print to this quotation ("William Blake Rejects the Enlightenment" 73); he, however, is referring to what is now identified as the 1804–05 print.



1. Blake, *Newton* (1795). 46.0 x 60.0 cm. Butlin, *Paintings and Drawings* no. 307. Reproduced courtesy of the Evangelical Lutheran Church in America. Image courtesy of the *William Blake Archive*.

and by outlining them in pen and ink (*Blake and the Idea of the Book* 128). Perhaps the rich, spongy forms resulting from Blake's color-printing technique suggested, in the later version, marine creatures, which he could then develop in pen and ink. The most notable additions in this regard are the two sea anemones or marine polyps rooted below Newton's buttocks. Their tentacles trail in an ocean current, an effect that lends a dynamism to this later design.

- 4 These sea anemones are Blake's first visual depiction of the polyp, the asexual self-regenerating "animal flower" that made its textual debut in Blake's poetry in *The Book of Los* (1795), in which the "formless" parts of Los are compared to a "white Polypus / Driv'n by waves & englob'd on the tide" (E 93). S. Foster Damon refers to the creatures depicted in the 1804–05 print of *Newton* as "squid" (332), erro-

neously I think, since their rooted stems and tentacles bear a much closer resemblance to the sea anemone. According to several eighteenth-century naturalists, the sea anemone, along with the polyp, is one of the many coralline members of the Zoophyte family. The close relationship between these creatures was explicitly articulated in three essays by Abbé Dicquemare published between 1773 and 1777 in *Philosophical Transactions*, all of them containing engravings by James Basire, under whom Blake served as an apprentice during those years (illus. 3 and 4).⁶ For Dicquemare, the larger sea anemone afforded the natural historian

6. William S. Doxey provides a complete list of *Philosophical Transactions* articles containing engravings by Basire published from 1772 to 1778 (254–60). Dicquemare's essays were translated from the original French for their publication in the *Transactions*.



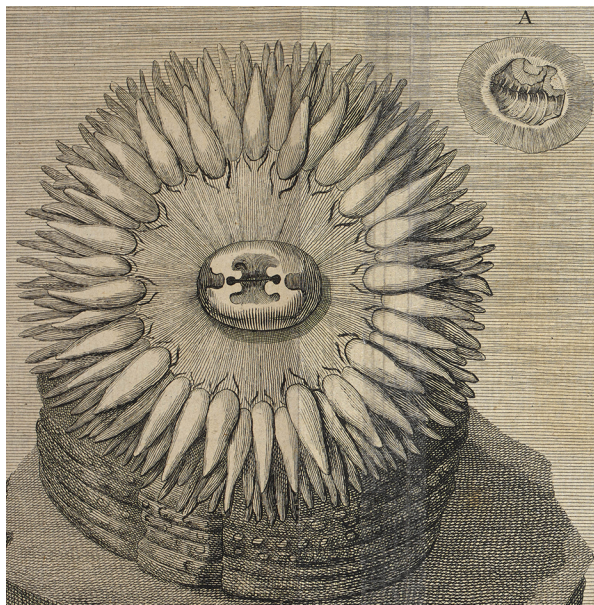
2. Blake, *Newton* (1804–05). 46.0 x 60.0 cm. Butlin, *Paintings and Drawings* no. 306. Reproduced courtesy of the Tate. Image © Tate, London 2015.

a more perceptible demonstration of the reproductive and self-organizing properties also observable in the polyp (properties that will be discussed in more detail in my section III): “In so minute an object as the fresh-water polypus, much is easily overlooked; but in the sea-anemonies, although we are far from seeing every thing, yet it is possible, even without the assistance of glasses, to discern a great deal which must escape us in the most diligent examination of the other animal” (“A Second Essay” 232). By his third essay, he felt confident enough to declare that his observations had “afforded [him] an opportunity to justify some eminent men, whose assertions concerning the multiplication of the fresh-water polypi by sections, have met with the most unmerited contradictions” (57).

5 Another essay in *Philosophical Transactions* containing engravings by Basire focuses on a third member of the Zoophyte family, the *Gorgonia* (illus. 5). In “On the Nature of the *Gorgonia*; That It Is a Real Marine Animal, and Not of a Mixed Nature, between Animal and Vegetable,” John Ellis writes that “the *gorgonia* is an animal of the *polype* kind, resembling the common fresh water *polype* in many of its qualities” (2). The polyp “sends out its young from its side, like buds,” as “every one knows,” and “the *gorgonia* grows nearly in the same manner” (2). Although the images of the sea anemone and *Gorgonia* engraved by Basire more closely resemble the coralline forms in Blake’s later



3 (top) and 4 (bottom).
 Basire, engravings for Dicquemare, "An Essay, towards Elucidating the History of the Sea-Anemonies," *Philosophical Transactions* (1773), tab. XVI, p. 402, detail, and tab. XVII, p. 403, detail. Reproduced courtesy of the British Library. Images © The British Library Board, General Reference Collection C.144.l.1.



print than do illustrations of the polyp in works addressed in section III below, all of the organisms demonstrate the vital, self-regenerative, and reproductive properties that are crucial to my discussion. In this essay I use the term polyp—which Blake spells "polypus"—to designate a set of vital properties exhibited by several organisms, including the sea anemone, in the coralline family of Zoophytes.⁷

7. According to volume 3 of the *Cyclopaedia* of Ephraim Chambers (1786–88), all coral animals, including the "polype," belong "to the genus of HYDRA, in the class of worms, and order of zoophytes, in the Linnaean system." Ebenezer Sibly's *A Key to Physic, and the Occult Sciences* (1795) reiterates this classification (60) and contains additional information, under the broader heading "Of Animal Flowers," on the "polypus" and the "sea-anemone." Sibly writes, "The grand argument for animal life in vegetables, was inferred from the curious construction of the fresh-water polypus, and the *actinia* genus, called animal flowers, sea-anemone, sea-sun-flower, &c. which having indeed the external form and figure of vegetables, with scarcely any progressive



5. Basire, engraving for Ellis, “On the Nature of the *Gorgonia*,” *Philosophical Transactions* (1776), tab. I, p. 8, detail. Reproduced courtesy of the British Library. Image © The British Library Board, General Reference Collection C.144.l.1.

- 6 In addition to the detailed coralline forms and the shading and enhanced musculature of Newton’s body, another aspect of the later print that is lacking in the 1795 design is the mathematical diagram that Newton is measuring with his dividers: a curve inscribed within a triangle. Although he is clearly using dividers on a scroll in the earlier print, no design is perceptible. These details—polypus and diagram—raise the question, what motivated Blake to make such significant changes to the design in the later print?

motion, might easily deceive superficial observers” (56). James Anderson’s *Recreations in Agriculture, Natural-History, Arts, and Miscellaneous Literature* (1799–1802) also calls the sea anemone an “animal flower ... an animal of the polypus tribe, so called from the resemblance it bears to the flower of that name” (2: 79, 80). In this essay, though I use Blake’s spelling of “polypus” when discussing the creature in connection with his work, I use “polyp” when discussing the larger eighteenth-century discourse. The term was also used in eighteenth-century medical texts, as it still is today, to designate abnormal growths of tissue.

The 1795 print is neglected in critical discussions,⁸ though Butlin’s discovery allows for a comparative examination of the two extant prints, executed nearly ten years apart. I take that opportunity here.

- 7 Butlin initially assumed that 1795 was the date of composition for the Tate (1804–05) print because it is the date that Blake himself inscribed on the work (see *Paintings and Drawings* no. 306). However, his discovery of the watermark led him to characterize Blake’s date as an instance of “visionary dating”: “There is absolutely no way in which the copy of *Newton* in the Tate Gallery ..., on paper watermarked 1804, can have received its basic color printing some nine years earlier in the ‘1795’ of the date actually written on the design by Blake himself” (“Physicality” 6). According to Viscomi, Blake is operating more like a print-maker than a painter: he dated the printable matrix and not each subsequent printing, just as he did with the illuminated books.⁹
- 8 Although the detailed coralline forms in the 1804–05 print provide substantial evidence, several commentators have been tentative about or outright opposed to locating the scene undersea. In the catalogue raisonné assembled for Gilchrist’s biography, William Michael Rossetti described the print as “full in the colour of the sky and rocky bank” (2: 203), while Dante Gabriel Rossetti—in the supplement to the biography—characterized Newton as sitting on a “rock covered with fossil substance or lichen of some kind”; interestingly, however, this “fossil substance” must have suggested something aquatic, since he compared its intricate and realistic-looking texture to “a photograph from a piece of seaweed” (1: 375). Yet a century later, Hagstrum described Newton as sitting “on a rock in [a] kind of stony and desolate landscape” (“William Blake Rejects the Enlightenment” 73); according to Gage, “it seems improbable that [Newton] is seated on the sea-bed (i.e. beneath the waters of materialism), as has recently been suggested” (372),¹⁰

8. Paul Miner, in the earliest full essay devoted to Blake’s symbolic treatment of the polypus in his poetry, writes, “Blake illustrated the sea anemone in his famous color print of *Newton*” (198n1), suggesting that he is referring to the 1804–05 print. Anne T. Kostelanetz [Mellor], Essick (“Blake’s ‘Newton’”), John Gage, and Stefani Engelstein all refer to and include reproductions of the later print in their studies, as does W. J. T. Mitchell. Reproductions of the work in the two book-length studies of Blake and Newton, Donald Ault’s *Visionary Physics* and Stuart Peterfreund’s *William Blake in a Newtonian World*, are of the later print. Additionally, all major articles and chapters addressing *Newton* over the past half century have discussed only the 1804–05 print.

9. I am again indebted to Viscomi’s manuscript for this information. Critics prior to Viscomi have also addressed the difficulty of dating Blake’s works. See, in addition to Butlin’s “A Newly Discovered Watermark,” Erdman’s “The Dating of William Blake’s Engravings.”

10. As Gage notes, the “recent suggestions” had been made by Kostelanetz and Kathleen Raine. Prior to these suggestions, Geoffrey

and the aquatic appearance of the vegetation is merely a result of the “colour-printing process, and does not differ from similar features in the *Nebuchadnezzar*” (373n8).¹¹ More recently, Mitchell asked, “Are we beholding a nocturnal meditation or an undersea tableau, a coral reef adorned with luminous vegetation washed by invisible tides?” (455).¹² I believe the latter, insofar as the 1804–05 print—with its carefully depicted sea anemones, sponges, and urchins—is concerned.

9 I do not make the same claim for the 1795 print, however, which appears not to be undersea. The coloring here suggests that Newton is sitting on a rock that is partially covered with moss and lichen, like the rocky forms surrounding Urizen in plate 9 of *The First Book of Urizen* (1794) (illus. 6). The blue-green area in the lower left corner of the 1795 print has been touched up in places, as at the base of the rock, to resemble tufts of grass, and the reddish-orange splotches here could be fallen leaves. There is more evidence in this early print to indicate that the scene is located at the base of a large rock in a dark forest, and not at the ocean bottom. I contend that between 1795 and 1804–05 Blake decided to change *Newton*’s rock to a coral reef—a drastic modification, and an instance of what Essick calls Blake’s “creative revisionism—not the static maintenance of the same ‘original’ image, but its continual reconception each time it is executed” (*Language of Adam* 163).¹³

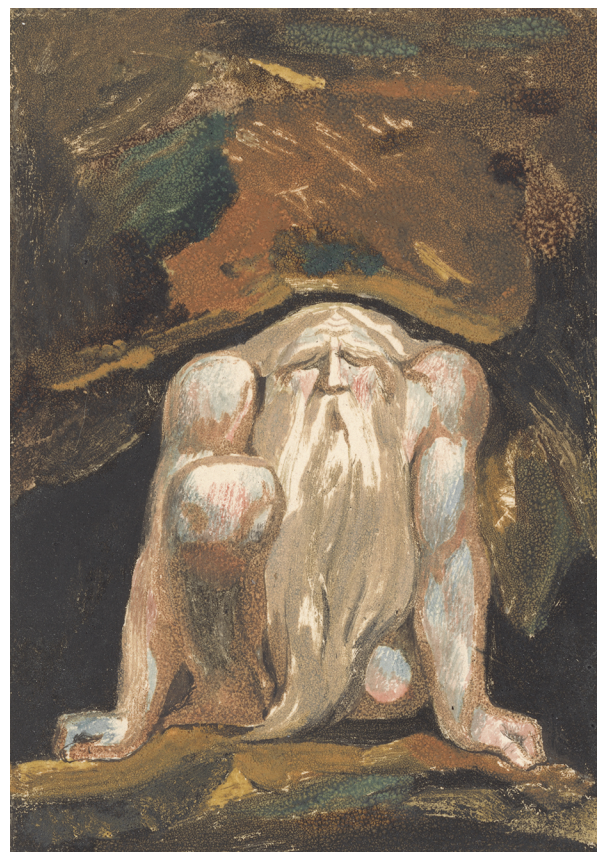
10 In this paper I wish first to explore—in sections II and III—the historical factors that may have motivated the 1804–05 reconception of *Newton*. I claim that there is a

Keynes, in discussing the pencil drawing on which the design is based, argued that “it has not usually been noticed that in [the later color print] Newton appears to be seated at the bottom of the sea, the water symbolising the materialism of Newton’s philosophy. The evidence of this are the anemones attached to the rock ... and the sea-weeds waving in the current” (*Pencil Drawings*, no. 8). Morton Paley also identifies the sea anemones in the later print, but refers to the “lichened rock”—not a coral reef—behind Newton (37).

11. Essick claims that “the oft repeated contention that ‘Newton’ is an underwater scene is as difficult to substantiate beyond reasonable doubt as it is hard to dismiss” (“Blake’s ‘Newton’” 149).

12. Ault also poses the possibility in the form of a question, suggesting another option as well: “Is the figure sitting under water on a rock? Or is he in an outer-space void (perhaps dotted with the particulate ‘aether’)?” (3). I find that the rich variety of forms surrounding Newton in the 1804–05 print discounts the hypothesis that the scene is set in merely an aether-dotted void.

13. Viscomi argues in his unpublished manuscript that the method of color printing made it so that Blake was not tied to the model. He could take liberties with the design because the medium encouraged improvisation. The millboard matrix from which the design was printed contained only the outline of the composition. Each time the outline was painted anew, the surface areas, as well as the foreground and background, created noticeably different-looking designs.



6. Blake, *The First Book of Urizen* copy C (1794), pl. 9. 14.8 x 10.4 cm. Yale Center for British Art, Paul Mellon Collection. B1978.43.1427.

complex and charged discourse concerning the significance of the polyp for proponents of vitalism in works of eighteenth-century natural philosophy.¹⁴ Furthermore, I

14. The concept of vitalism took many forms in the eighteenth century, but it can be broadly construed as a response to Cartesian mechanism, which described the universe as obeying physico-mechanical principles; for mechanists, all bodily phenomena could be explained in terms of inert, extended matter and motion, the laws of which Newton elaborated. In the work of Descartes, the machine was an apt metaphor for living bodies, man being distinguished from the beasts insofar as he possessed an immaterial soul. For vitalist thinkers, however, this mechanical model could not explain living organisms, whose matter appeared much less inert than described by Descartes and Newton. According to Peter Hanns Reill, for vitalists, “living matter was seen as containing an immanent principle of self-movement or self-organization whose sources lay in active powers, which resided in matter itself” (7). My use of the terms vitalism and mechanism should be read with this distinction in mind: vitalism refers to an immanent and active principle within living matter, while mechanism implies inert matter acted upon from without and obeying fixed laws. As Ault points out, however, Newton’s theory of gravity, or attractive forces, undermined the strict mechanism of Descartes (8), so Blake’s labeling

find that Blake's treatment of the corallines in the later *Newton* print shares philosophical affinities with the vast and contested body of writing on the polyp as an emblem of vitalist metaphysics. In section IV I argue that Blake's employment of the polypus and the undersea setting in his revised *Newton* satirizes what he saw as the inflexibility of Newton's mechanical philosophy, which had been celebrated throughout the eighteenth century. The ironic depiction of Newton in the 1804–05 design features a mechanistic philosopher contracted in underwater darkness, blind to the vital properties of the self-replicating coralline creatures for which his physical laws could not account. Moreover, his gloriously powerful body is contracted and fallen solely as a result of his mental fixation with an abstract diagram.

II.

- 11 The sea anemone in the later print of *Newton* corresponds to a proliferation of references to the polypus in Blake's poetry between 1795 and 1804–05. After its first appearance in *The Book of Los*, the polypus emerges in abundance in the texts of the later prophecies: three times in *The Four Zoas*, nine times in *Milton*, and eight times in *Jerusalem*. In addition, there are the numerous designs for *Jerusalem* that feature human-animal-plant hybrids, the representative symbol for which, according to Denise Gigante, is the polyp: "By providing empirical evidence for the generation of new life forms beyond the traditional coupling of the sexes, [the polyp] decentralized God's creative power, spreading it through all the fibers of nature and shattering those structures (preformed parts and germs) supposed to contain it" ("Blake's Living Form" 481).¹⁵ After 1795—and thus after the initial printings of *Newton*—the polypus occupied a significant place in Blake's imagination, appearing as a multifaceted motif in several works, and the change to the design of *Newton* serves as a record of this artistic transformation.¹⁶

Newton a mechanist is not entirely fair. Kevin Hutchings makes a similar distinction between Cartesian mechanism and Newton's challenge to it (120-23), noting that Blake's equation of Newton with mechanistic philosophy is a "reductive misrepresentation" (122).

15. See chapter 3 of her *Life*, which is devoted to an analysis of epigenetic symbols in both *Jerusalem* and *The First Book of Urizen* (the latter does not mention or visually depict the polypus). Epigenesis refers to the theory that matter contains within itself the capacity for growth and differentiation into various organs (in the case of an embryo). Gigante uses this biological model as a lens through which to discuss Blake's two illuminated books and speculates that Blake may have been influenced in this regard by the German vitalist physiologists Caspar Wolff and Johann Blumenbach (111).

16. This study, in confining its interpretive scope to the two large color prints of *Newton*, does not attempt to analyze the polypus as it functions in the poetry of Blake's prophecies. Aside from Gigante's chapter (see note 15), the most extended study of the polypus motif in Blake's poetry remains Miner's essay.

- 12 What influenced Blake to feature the polypus so abundantly in his poetry after 1795 and to depict it in the 1804–05 *Newton* print? In the second chapter of *Anxious Anatomy*, Engelstein suggests that Blake's source was the *Cyclopaedia* (1802–20), for which he engraved eight plates: "Rees's *Cyclopaedia* discusses coral not only under its own entry ..., but also under the heading 'Polype, Marine'" (104).¹⁷ Although Essick writes that "Blake may have become involved in the project as early as 1803" (*Commercial Book Illustrations* 109), Blake could have read the same entries that Engelstein refers to in Rees's 1786–88 edition of the *Cyclopaedia*.¹⁸

- 13 I find the identification of the *Cyclopaedia* as Blake's source to be doubtful for several reasons. Although he contributed engravings to the 1802–20 edition, those engravings were mainly of sculpture, unrelated to any coralline topic. Blake's sculpture plates have imprint dates of 1815 and 1816 (Essick, *Commercial Book Illustrations* 110-12), while fascicle 55, containing the entry on the "polype," was published in 1814. Given these late dates, the edition of the *Cyclopaedia* that Engelstein and Mitchell cite could not have been the source for Blake's incorporation of the polypus in the *Newton* print. Even the entry on coral—to which Engelstein alludes—was not published until 1808, more than two years after the later version of *Newton* was printed.¹⁹ Moreover, Blake's consistent spelling of "polypus" differs from the "polype" that appears in all editions of the *Cyclopaedia*.²⁰ I contend that the entry on the polyp in Rees's editions is only part of a varied discourse that proliferated over the course of the eighteenth century, and that, in addition to the *Philosophical Transactions* articles with engravings by Basire, there are more likely and compelling sources for Blake's employment of the polypus—among them Georges-Louis Leclerc, Comte de Buffon, and Erasmus Darwin.²¹

17. Mitchell also suggests that Rees was Blake's primary influence (457).

18. The *Cyclopaedia* was first published by Ephraim Chambers in 1728, and several editions followed. Rees supplemented and expanded upon Chambers in a five-volume 1786–88 edition. The version to which Blake contributed engravings had grown to thirty-nine volumes.

19. Thomas Butts's receipt account with Blake indicates that the later print was purchased on 7 Sept. 1805 (Keynes, *Letters* 117-18).

20. Blake's use of the three-syllable spelling was metrically significant as well. I am grateful to the journal's anonymous reader for pointing this out.

21. Though I focus on literary sources (some of which—such as the *Philosophical Transactions* articles—contain illustrations), it is also possible that Blake witnessed an exhibition of coralline creatures. Nelson Hilton speculates that Blake may have seen a "polypus" in the 1780s at John Hunter's Anatomical Theatre ("Blake and the Perception of Science" 57-58). Moreover, during his time by the sea in Felpham (1800–03), he might have observed coralline creatures in tidal pools near his home.

III.

- 14 References to the polyp in the eighteenth century are difficult to find without the accompanying name of Abraham Trembley, the Swiss naturalist whose experiments with the freshwater polyp in the early 1740s were first published in French in 1744. His findings were discussed and replicated in England even before this date, however, as evidenced by his three-way correspondence with the president of the Royal Society at the time, Martin Folkes, and the French naturalist Buffon. These letters were published in *Philosophical Transactions* in 1742–43, and Trembley's reputation in England grew immediately thereafter.²² Another correspondent with Folkes, Henry Baker, an Englishman and fellow of the Royal Society, published *An Attempt towards a Natural History of the Polype* in 1743, which both summarized Trembley's work and described Baker's own course of experiments that replicated Trembley's. Baker's work includes over 150 illustrations of the polyp, several of them bearing a resemblance to the waving tendrils in the coralline forms in Blake's 1804–05 print of *Newton* (illus. 7).



7. Baker, *An Attempt towards a Natural History of the Polype* (1743), p. 32. Reproduced courtesy of the British Library. Image © The British Library Board, General Reference Collection 955.d.21.

22. For more detailed historical accounts of Trembley and his experiments, see Vartanian and chapter 3 of Schwartz.

It is quite likely that Blake would have been aware of Trembley's experiments without reading a direct account of them; Engelstein makes the astute observation that he makes a punning reference to Trembley in *Milton*, where the polypus "Must *tremble* in the Heavens" (quoted in Engelstein 101; italics hers).²³

- 15 Trembley (and Baker) discovered that cutting the polyp into segments resulted in the regeneration of each segment into an autonomous organism; each of these autonomous beings would then become parents themselves, capable of further division into separate organisms.²⁴ In the absence of cutting, the polyp reproduced asexually: offspring would emerge as buds from a creature's main stem, vegetate, and detach from the parent, often budding offspring of their own before detaching. Moreover, Trembley found that he could graft separate polyps to each other to form a larger, hybrid creature. Thus, the organism could exponentially divide into multiple autonomous creatures and those disparate organisms could fuse with each other and become a unified polyp. Given the polyp's plant-like characteristics and the fact that its original discoverer, Antonie van Leeuwenhoek, had called it a plant, Trembley resisted identifying the organism as an animal. He was eventually convinced by the older and more renowned naturalist René Réaumur, who is credited with naming the polyp.²⁵
- 16 The creature's remarkable regenerative capabilities challenged both Cartesian mechanism and Newtonian physical laws, which dominated natural philosophy throughout the first half of the eighteenth century. Stephen Gaukroger contends that Trembley's study challenged the preformationist theory of reproduction held by biomechanics, which stated that preexistent invisible germs of all organisms were contained in the ovaries or sperm (depending on the variant of the theory) of humanity's first parents;²⁶ challenged classification (was the polyp an animal or plant?); and suggested

23. Engelstein is one of the few critics to connect Trembley and Blake. Hilton was the first Blake scholar to discuss Trembley within the history of the polyp in the eighteenth century and to apply this history to Blake's work (*Literal Imagination* 87–89). Hutchings also discusses him in connection with Blake's use of the polypus in *Milton* (188ff.).

24. Although Trembley was the first to observe this in the polyp, such properties of living organisms had been noted as early as Aristotle, who writes in *De anima* that "plants and many animals when divided continue to live, and each segment is thought to retain the same kind of soul" (409a8–9).

25. Resistance to identifying the polyp as an animal did not stop with Réaumur's assertion. According to Vartanian, Voltaire was not alone in insisting in 1768 that the polyp was a plant (284).

26. Also known as preexistence, the theory of preformation also held that "there was no true generation in living nature: all organic structures were literally created by God at the beginning. Mechanical processes merely brought the miniatures to life one by one to maintain the successive generations" (Bowler 46). The contrary position was the

the disturbing possibility that nature was able to generate living beings. “If this was the case—and especially if the distinctions between mineral, plant, and animal realms were ones of degree rather than ones of kind—then the question had to be raised whether matter was intrinsically active” (Gaukroger 358). Thus, as Vartanian writes, “the polyp became involved in speculations ... ranging from the nature of the soul to the teleology of organic forms” (260).²⁷ Would God have preordained such rampant, chaotic, and seemingly monstrous growth? Although for Foucault “the continuity of nature is a requirement of all natural history” in the eighteenth century (147), the polyp represented the shadowy underside of such continuity, resistant as the creature was to the rigid classificatory categories—instituted by Linnaeus and others—that characterized eighteenth-century taxonomy.²⁸

- 17 Such larger metaphysical debates and speculations were not taken up by Trembley himself, who remained a preformationist despite the implications of his experiments. Rather, it was Julien Offray de La Mettrie, whose *L’homme machine* was published in 1748 (with the first English translation, *Man a Machine*, appearing the following year), who based his atheist materialist philosophy on Trembley’s experiments with the polyp. “Look in your turn at Trembley’s polyp!” he exclaims, “Does it not contain inside it the causes of its own regeneration? Why then would it be absurd to believe that there exist physical causes for which everything was made. ... There may be something else which is neither chance nor God; I mean nature, the study of which can as a result only produce unbelievers” (24). In La Mettrie’s view, the self-propagating polyp was one of many examples of what Albrecht von Haller—to whom La Mettrie dedicated *L’homme machine*—termed the “irritability” of animal muscular tissue: the ability to contract with a force far greater than the force of the stimulus, a phenomenon that could be demonstrated even in severed human limbs.²⁹ For

theory of epigenesis, defined in note 15. For a more detailed historical account of the preformationism/epigenesis debate, see Roe.

27. Reill also discusses the challenge that the polyp presented to preformationism (62).

28. The polyp’s significance as an emblem of changeability predates eighteenth-century debates concerning mechanism and vitalism. Desiderius Erasmus advises readers to “adopt the outlook of the polyp” and claims that “there will be nothing to prevent us from applying the name ‘polyps’ to those who turn themselves into any and every shape in the wish to stand well with everyone” (*Adages* 41, 42). I am grateful to Jessica Wolfe for this reference. In the context of Blake’s *Newton*, I emphasize Erasmus’s allusion to the material transformative capacities of the polyp as resonating with eighteenth-century vitalist accounts of the corallines; I do not mean to suggest that Blake makes the same metaphorical argument in applying such changeability to human behavior.

29. See Reill 130ff. for a more detailed account of Haller’s work. Blake was certainly aware of Haller, since he executed a portrait engraving for Henry’s *Memoirs of Albert de Haller*, published in 1783.

La Mettrie, irritability pointed to the generative and active powers inherent in matter itself; *contra* Cartesian mechanism and Newtonian laws of force, which were helpless to explain an irritable reaction of tissue far exceeding the force of stimulus, no God or spiritual agent was necessary as first, efficient, or final cause. As Vartanian writes, “In La Mettrie’s opinion, the ability of severed muscle-tissue to move in its functional manner when touched (independently of the nervous system) was evidence of the materiality of the soul or, at least, of the ‘vital principle’ of organisms” (271). In the polyp, this vitality was present not just in the parent organism, but also in all of its autonomous parts when the creature was cut into pieces.

- 18 La Mettrie pushed his controversial vitalist materialism further with his next publication, *L’homme plante* (1748). Far from excluding man from taxonomic ambiguity, he instead writes (after noting several parallels between human and plant functionality): “If man is not a vegetal production ... he is at least an insect whose roots grow into the womb, as the fertilised plant germs do in theirs. However, there would be nothing surprising about the idea, since Needham [John Needham, British natural philosopher] observes that polyps, barnacles and other animals multiply themselves by vegetation” (82). By describing man as a root-producing insect, he introduces a flat ontology to his natural system, implicitly bringing man to the level of the polyp and the vegetable.³⁰ The suggestions in the two works that man is an organic machine capable of plant-like self-generation scandalized orthodox natural philosophy and triggered much debate both on the continent and in England throughout the latter half of the eighteenth century. In La Mettrie’s metaphysics, the matter of all living organisms is self-motile and self-organizing, and there is no divine causal agent or immaterial soul to distinguish man from the beasts.

- 19 La Mettrie’s flat ontology describes a nature without God, and as such it differs from a Blakean metaphysics that locates divinity not in a transcendent godhead, but in the immortal “scatterd portions” of living material forms (*The*

30. He also compares man to a plant in *Man a Machine*: “[Man] is like a wandering plant which has transplanted itself” (9). The concept of flat ontology is shared today by the object-oriented philosophy of Graham Harman, Levi Bryant, Ian Bogost, and others. Harman, for instance, writes, “Whether we speak of humans, amphibians, insects, or birds ... no genuine *ontological* distinctions between the species have emerged so far, whatever our preconceptions on this question may be” (220). See also Timothy Morton, who notes, “We share 98 percent of our DNA with chimps and 35 percent with daffodils ... That’s the disturbing thing about ‘animals’—at bottom they are vegetables” (66, 68). The same idea is expressed by Gilles Deleuze, who, in his book on the vital characteristics of Henri Bergson’s philosophy, notes the persistent “hint of the animate in plants, and of the vegetable in animals” (96).

Four Zoas 114 [110].7, E 385).³¹ According to La Mettrie, the polyp not only decentralized God's power, as Gigante claims, but made God's power unnecessary. As I will argue in the following section, the polypus as it appears in the 1804–05 print of *Newton* serves as a symbol of a godless vitalist system that contrasts with a Newtonian deistic metaphysics in which form is imposed externally and adheres to fixed physical laws. Furthermore, Blake's rendering of Newton's powerful body as a fallen "human form divine," which exhibits some of the vitalist properties of the polyp, provides an anti-atheistic critique of La Mettrie's philosophy.

20 Trembley's correspondent Buffon is another vitalist natural philosopher from whom Blake might have drawn in his treatment of the polypus. Buffon's thirty-six-volume *Natural History* was published 1749–88 and was widely available in multiple English translations. Most notable among these was J. S. Barr's rendering, titled *Barr's Buffon*, the first edition of which was published in 1792. Buffon's work was so well known and discussed both in England and on the continent in the latter half of the century that "to know what Buffon or Albrecht von Haller ... believed did not require one either to have read these authors directly or to have owned their books: the compilations and reviews sufficed" (Reill 13). Like La Mettrie, Buffon believed that matter was self-activating and possessed epigenetic qualities. Though he was nominally a Lockean and Cartesian, his belief in spontaneous generation and an "interior mould" that guided the formation of organisms from within placed him outside traditional mechanist positions. Reill claims, "Like Aristotle and the hermetic philosophers, Buffon vivified much of nature" (45). And as Gaukroger notes, Buffon's proto-evolutionary vitalism was the first to historicize and "dynamize" natural philosophy, in contrast to Newton's universe, for which the physical laws were constant (368).³²

21 The parallel between La Mettrie and Buffon can be seen in the importance that the latter ascribes to the polyp, which for him bridges the animal and vegetable kingdoms. He writes, in Barr's translation:

There is no absolute essential and general difference between animals and vegetables, but that nature descends, by degrees, imperceptibly from an animal, which is the most perfect, to that which is the least, and from the latter to the vegetable. The water polypus may, therefore, be considered as the line where the animal creation ends and that of

31. See also the concluding assertion of *The Marriage of Heaven and Hell* that "every thing that lives is Holy" (E 45) and Blake's annotation to Lavater's *Aphorisms on Man*: "every thing on earth is the word of God & in its essence is God" (E 599).

32. See also Bowler 76–80 and Foucault, who quotes Buffon's anti-Linnaean claim that "nothing really exists in nature except individuals" (147).

plants begin [*sic*]. ... The [animal] foetus, at its first formation, may be said rather to vegetate than live. (2: 262–63)

By making the epigenetic claim that the animal fetus vegetates, or expands its material form like a plant,³³ Buffon suggests that humans, polyps, and plants all develop in the same fashion, a concept that Blake vividly depicts in his hybrid forms, such as the frontispiece of *For Children: The Gates of Paradise* with its vermicular infant on a leaf (illus. 8).



8. Blake, *For Children: The Gates of Paradise* copy D (1793), pl. 1. 9.4 x 6.3 cm. Library of Congress. Image courtesy of the *William Blake Archive*.

The text for this plate, "What is Man!," speaks to the ambiguity of classification raised by La Mettrie and Buffon. Schwartz devotes much attention to Blake's use of the worm in this regard: "Simultaneously seductive and horrifying,

33. For Buffon, this is something different from living, as the last phrase indicates. He is perhaps differentiating between the asexual cell growth of the embryo and sexual animal reproduction.

helpless and shrewd, the worm irrevocably demonstrates the slippage of true forms so that its putrid figure is transformed into a constructive agent of cultural representation” (xxiv). Another of the many hybrid human-plant examples in Blake’s designs is plate 3 of *For Children*, which features a woman stooping to pull a child out of the earth as if she were harvesting a plant (illus. 9); the editors of the *Blake Archive* note that Blake may here be drawing on the formal likeness between mandrakes and human bodies.



9. Blake, *For Children: The Gates of Paradise* copy D (1793), pl. 3. 7.8 x 6.4 cm. Library of Congress. Image courtesy of the *William Blake Archive*.

This similarity between animal and vegetable is—for Buffon and for La Mettrie—due to the vital properties of matter itself. As Buffon claims, “The living animated nature, instead of composing a metaphysical degree of beings, is a physical property, common to all matter” (2: 272). This claim works against the earlier passage, quoted above, in which he describes a chain of beings descending from the most perfect to the least. Here he rejects the notion of a “metaphysical degree of beings,” instead asserting that all life is reducible to the animated quality of matter itself, shared by all organisms. Hence, the flat ontology implied by La Mettrie is evident in Buffon as well.

22 The “polypus” is discussed in several volumes of *Natural History* and, unsurprisingly, Trembley’s experiments are

described at length.³⁴ Regarding the indeterminate form of the polyp, Buffon concludes: “We cannot call these animals, nor can we say they are vegetables, and certainly we can still less assert they are minerals” (3: 166). Rather, the polyp is a vital, self-proliferating nexus where the animal and vegetable kingdoms converge, an idea often repeated by English naturalists and commentators in the latter half of the century. For example, Johann Herder’s *Outlines of a Philosophy of the History of Man*, a copy of which was owned by Blake’s friend Henry Fuseli (according to the auction catalogue of his library), reads: “When Nature makes a transition from a plant, or a stone, to the animal kingdom, does she more clearly unfold to us the instincts of organic powers? The polypus appears to blossom like a plant, yet is an animal” (60).³⁵

23 Buffon is also notable, insofar as Blake’s 1804–05 *Newton* is concerned, for not restricting his discussion of the polyp to Trembley’s freshwater variety, but for describing the many forms that the creature can take, including the sea anemone. A two-volume abridged translation (not Barr’s) of *Natural History*, also published in 1792, contains a nine-page section on the “polypus.” In discussing its marine forms Buffon writes, “In other parts of the sea are seen sponges, of various magnitude, and extraordinary appearances, assuming a variety of phantastic forms, like large mushrooms, mitres, fonts, and flower-pots” (2: 396).³⁶ He

34. In addition to the passages quoted above, Barr’s translation addresses the “polypus” in four other volumes. Three volumes of an earlier, six-volume English translation (1775–76) contain references to the “polypus”; vol. 4 features an extended description of the creature, with references to Trembley.

35. See also John Collier’s *Essays on the Progress of the Vital Principle from the Vegetable to the Animal Kingdoms and the Soul of Man* (1800): “The line of demarcation is so slightly marked in the Polypus, Starfish, Sea-nettle, and other marine plants, as well as in the Tremellae and self-moving plants, that ... it remains a doubt whether to class them as subjects of the vegetable kingdom or animal” (249–50). Others who reiterate Buffon’s claim for the “polypus” as bridge between animal and vegetable include Bonnet (24), Spallanzani (318), Sturm (3: 116), Goldsmith (7: 244), Sullivan (3: 338), Smellie (524), Brookes (4: xiv), Mavor (2–3), Lobb (2: 188), Wesley (3: 73), and Sibly (52). All of these works were published in English before 1804. According to the 1821 sale catalogue of his library, William Hayley, Blake’s patron and neighbor in Felpham from 1800 to 1803, owned Goldsmith’s *An History of the Earth, and Animated Nature* (Munby 2: 115). I include this lengthy list to indicate the degree to which the “polypus” was a contentious issue of discussion in England in the sixty years following Trembley’s experiments. And there are many works that do not match Blake’s spelling of “polypus,” but that also taxonomically locate the creature in the unstable border between plant and animal. For instance, Adams devotes an entire chapter to the “Water Polipe,” discussing its properties as well as Trembley’s experiments. Significantly, this chapter, full of illustrations, is the last of his chapters on animals; the following chapter is “Of Vegetables.”

36. Like Buffon, Dicquemare observed the same vitalist properties of the polyp in the larger sea anemone, and he was aware of the anti-

goes on to discuss how the polyp produces the coral in and on which it lives, with the multitude of excretions joined together to form “a considerable mass, and, as most animals are productive, in proportion to their minuteness, so these multiplying in a surprising degree, at length form those extensive forests that cover the bottom of the deep” (2: 398). Such a living forest of sponges and flower-like coralline forms is an apt description of the “considerable mass” upon which Newton sits in the 1804–05 color print, as opposed to the mostly barren rock of the 1795 version.

- 24 Another writer who shared the vitalist attitudes of La Mettrie and Buffon and who also addressed the mysterious properties of the polyp is equally—if not more—likely as a source: Erasmus Darwin.³⁷ Blake engraved six plates for the 1791–95 editions of Darwin’s *The Botanic Garden*, and both men were connected through the publisher Joseph Johnson (Essick, *Commercial Book Illustrations* 45–48). There is little doubt that Blake was familiar with Darwin’s work, and several Blake critics have noted similarities between the two.³⁸ Darwin was quite prolific between 1795 and 1804, publish-

mechanistic metaphysical implications of such organisms: “The sea-anemones give evident marks of sensibility; shall I thence conclude, that a soul animates them; or shall I grant that they are deprived of sensation, although favoured with the organs of it?” (“A Second Essay” 239). In the third essay the question still concerns him: “Can it be admitted that in these animals the vital principle is peculiar to every particle?” (64). The sea anemone takes its name from the flower, as Anderson later remarked (see note 7). Anderson also observed a similarity between other types of polyp and the marigold blossom (2: 80); see Sibly 59 on the sea anemone and the marigold. The rough, tufted texture of the creatures in Blake’s later color print conveys this parallel, suggesting that there may be more polyps on the reef than just the two sea anemones.

37. Schwartz, who devotes a chapter to Darwin (not in connection with Blake), claims that he is a mechanist, “following in the tradition of empiricist philosophers Francis Bacon, Isaac Newton, and John Locke” (41). I find this position difficult to support. I grant that Darwin was an empiricist, like Blake’s infamous triumvirate of Bacon, Newton, and Locke, but he believed in spontaneous generation and the self-activating powers of the natural world (see additional note 1 of *The Temple of Nature*, entitled “Spontaneous Vitality of Microscopic Animals”). *The Economy of Vegetation* (the first part of *The Botanic Garden*) describes, in poetry and philosophic notes, the dynamic material evolution of the earth, echoing many of Buffon’s proto-evolutionary ideas. This is a telluric narrative quite out of keeping with Newton’s static cosmology. What is more, God is absent as first cause in Darwin’s account, which would have scandalized Bacon, Newton, and Locke, just as it did many of Darwin’s contemporaries. Thus, while Darwin could be described as a materialist, I think it inaccurate to label him a mechanist. Alan Richardson discusses how the overlapping of the terms “mechanism,” “materialism,” and “vitalism” in the latter decades of the eighteenth century causes confusion for modern readers (192n58).

38. Erdman was one of the first to note parallels between Darwin’s *The Loves of the Plants*—the second part of *The Botanic Garden*—and Blake’s *The Book of Thel* (*The Illuminated Blake* 33–34). See also Baine, King-Hele’s chapter on Blake and Darwin, and, more recently, Green.

ing two major works of natural philosophy, *Zoonomia* (1794–96) and *Phytologia* (1800), as well as his well-known and best-selling philosophical poem *The Temple of Nature* (1803)—all of which were published by Johnson.³⁹ The polyp is mentioned in all three. Describing vegetable animation in the first volume of *Zoonomia*, Darwin writes that “the anthers and stigmas are real animals, attached indeed to their parent tree like polypi or coral insects, but capable of spontaneous motion” (1: 105). As in Buffon, the polyp is here linked to coralline animals, while it is also used as an analogy for vegetable growth. And, like La Mettrie and Buffon, he conflates the vegetable and animal kingdoms: the reproductive organs of plants are “real animals.”⁴⁰ Darwin, who claims that polyps are “all male animals” (1: 488), carries the conflation by analogy further, stating that the creature “can only propagate like vegetable buds by the same kind of irritative motions, which produces the growth of his own body” (1: 495). The use of the phrase “irritative motions” to describe epigenetic growth suggests Darwin’s familiarity with the vitalist principle of irritability argued for by continental natural philosophers such as Haller and La Mettrie. The same language persists in *Phytologia*, where the polyp is again linked to coral life: “A tree therefore is a family or swarm of individual plants, like the polypus, with its young growing out of its sides, or like the branching cells of the coral-insect” (2). Later in the work, Darwin also describes the cutting and grafting of the polyp by Johann Friedrich Blumenbach, who replicated Trembley’s experiments (121–23).

- 25 Like *The Botanic Garden* before it, *The Temple of Nature* poetically describes—with the supplement of natural-philosophical prose notes—a world formed by what contemporary theorist Jane Bennett calls “vibrant matter.”⁴¹ Darwin echoes La Mettrie’s and Buffon’s arguments for the self-activating and self-organizing capacity of organic matter, which is radically different from Newton’s inert corpuscles: “Hence without parent by spontaneous birth / Rise the first specks of animated earth” (1.4.247–48). The “animated earth” recalls the *anima*, or world-soul, of the Neoplatonists, which for eighteenth-century vitalists was diffused as an immanent, generative principle throughout living matter, as Trembley’s polyp saliently demonstrated.⁴² In the

39. Hayley owned two copies of *The Botanic Garden*, as well as copies of *Zoonomia* and *The Temple of Nature* (Munby 2: 118).

40. Darwin had already achieved notoriety for his erotic anthropomorphizing of floral reproduction in *The Loves of the Plants*.

41. Placing herself in the monist tradition of Spinoza, Bennett writes, “The habit of parsing the world into dull matter (it, things) and vibrant life (us, beings) ... encourage[s] us to ignore the vitality of matter and the lively powers of material formation” (vii).

42. See, for instance, Plotinus: “Nature is a Soul, offspring of a yet earlier Soul of more powerful life” and “through soul this universe is a God” (*Enneads* 3.8.4, 5.1.2). The concept of *anima* can be traced fur-

eighth additional note Darwin describes how polyps “perpetually propagate themselves by solitary reproduction.” Moreover, in the second canto, he writes:

So the male Polypus parental swims,
And branching infants bristle all his limbs;
.....
Unknown to sex the pregnant oyster swells,
And coral-insects build their radiate shells.
(2.2.85-86, 89-90)

By linking the polyp to other coral insects, Darwin is referring to the marine form of the creature, and by describing the offspring as “branching,” he again echoes La Mettrie and Buffon in hybridizing the creature as a link between the plant and animal kingdoms, an animal flower.

- 26 Even if Blake did not read these lines in the poem itself, this passage is quoted in reviews of *The Temple of Nature* in the *Annual Review* for 1803 (1804): 592-93 and the *Universal Magazine* (May 1804): 514.⁴³ In addition to reviews of Darwin’s work, several other references to the “polypus” can be found in British periodicals between 1795 and 1804. One is a letter from “B. E.” to both the *Universal Magazine* (Aug. 1801) and the *Edinburgh Magazine* (Oct. 1801), “On the Difference between Animals and Vegetables,” which contains references to Buffon and Darwin.⁴⁴
- 27 Thus, many works participate—more forcefully and to greater effect than Rees’s *Cyclopaedia* entry—in the eighteenth-century debate over the vital properties of the polyp. I contend that Blake drew on the ideas shared by La Mettrie, Buffon, and Darwin—and disseminated in the numerous works that engage in the same ideas—to develop a design in the later *Newton* print that is more symbolically complex than the 1795 version.

ther back to Plato’s *Timaeus*, where God, in creating the material universe, “in the center put the soul, which he diffused throughout the body, making it also to be the exterior environment of it,” and thus “he created the world a blessed god” (34b).

43. *Phytologia* was reviewed in the *Monthly Review* of Oct. 1800: “According to some [naturalists], the union of small beings, which may be reproduced individually, has formed the approximation of the coral and polypus to a vegetable state” (114).

44. Buffon is even quoted: “The fresh water polypus may be regarded as the last of animals and the first of plants” (*Edinburgh Magazine* 255), though the author is arguing against Buffon’s famous conflation of the two kingdoms. An anonymous letter to the editor of the July 1804 issue of the *Universal Magazine* is entitled “On the Propagation of Life among Animals and Vegetables” and states, “The principle of life seems equally diffused through every part of [the polypus’s] structure” (15).

IV.

- 28 Blake’s depiction of Newton in the two color prints comes after nearly a century of artistic glorification of the natural philosopher in England and elsewhere. Newton’s legacy as the symbol of Enlightenment reason is nowhere so aptly expressed as in Pope’s famous epitaph: “Nature and Nature’s Laws lay hid in Night. / God said, *Let Newton be!* and All was *Light*” (6: 317). For Pope and other deifiers of Newton in the years following his death in 1727, he is the “light” in the Enlightenment (though of course Pope would not have used this term), not least because his *Opticks* (1704) transformed the way in which light was understood. James Thomson’s “A Poem Sacred to the Memory of Sir Isaac Newton” (1727) is even more unabashed and hyperbolic than Pope in deifying Newton, who is variously described as the “all-piercing sage” (l. 23) and the “philosophic sun” (l. 90) “whose well purged penetrating eye” (l. 73) “could trace the secret hand of Providence” (l. 15). He is capable of “ardent flight” (l. 57) and is powerful enough to subdue nature so that “every latent glory” (l. 38) is laid open to his view. In Thomson’s mythologizing account, Newton’s laws bind the sun and planets to their spheres, and his mind is even brighter than light in that he could discern the latter’s constituent colors.⁴⁵
- 29 In the *Newton* prints Blake is drastically subverting this poetic tradition⁴⁶—nothing could be more antithetical to Thomson’s image of Newton than the nude figure hunched in the gloom of the seafloor in the later print. Taken in isolation, Newton’s youthful, muscular body is consistent with the angelic, heroic image conjured by Thomson’s poem. But Blake ironizes this deification by immobilizing such a body in a contracted, humiliating posture.⁴⁷ The same contraction and lowering of a powerful human form is seen in *Newton*’s companion color print, *Nebuchadnezzar*, which depicts the tyrant bestialized, crawling on his hands and

45. Here Thomson attempts to one-up Milton’s famous hymn to light at the beginning of book 3 of *Paradise Lost* by placing Newton above God insofar as Newton could discern and dissect the light that, for Milton, was God.

46. See Nicolson for a full account of the treatment of Newton in eighteenth-century British poetry. She claims that Blake’s animosity belied a secret attraction: “We may question whether Blake could have hated Newton so heartily had he not responded to him more than he was willing to admit” (166); see also Ault 162.

47. Anne Mellor compellingly argues that the posture of Blake’s figures is more revealing than facial expressions or other physical attributes, given the smallness of most of Blake’s designs: “Once the identity of, say, Urizen has been established ... his particular gesture—crouching down, crawling, spreading his arms over a prostrate figure—further exemplifies his closed or oppressive mind” (*Human Form Divine* xxii). Janet Warner also discusses the language of gesture in Blake’s designs. She writes that Newton’s “downturned” left hand signifies “creativity turned to rationalism and abstraction” (102).

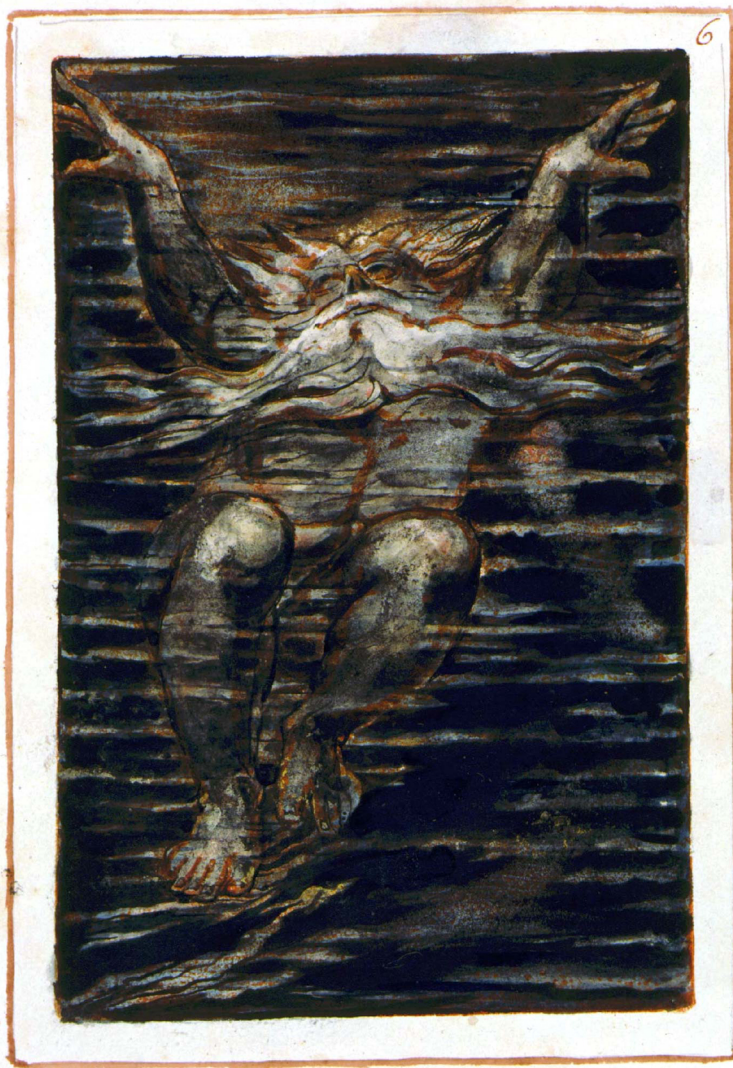
knees with a terrified expression on his face.⁴⁸ Mellor argues that these two prints show Blake using “the conventions of romantic classicism” to depict a fallen world characterized by political tyranny and “limited, rationalistic philosophy” (*Human Form Divine* 151, 155).⁴⁹ It is Newton’s mind, pre-

48. Paley reads Newton’s posture as “mid-way between the hunched-over Adam [of *God Judging Adam*] and the on-all-fours Nebuchadnezzar” (37). According to Anthony Blunt, *Nebuchadnezzar* “is evidently intended as an exact pendant to the *Newton*, and the parallel probably extends to the settings” (*Art of William Blake* 60n17).

49. Blunt traces the position of Newton’s body to Blake’s drawing based on Ghisi’s engraving of Michelangelo’s *Abias* on the ceiling of the Sistine Chapel (Butlin, *Paintings and Drawings* no. 168, verso). He claims that Blake combined the Michelangelesque form with the figure of Euclid from Raphael’s *The School of Athens* (“Symbolism of the Compasses” 61n6, *Art of William Blake* 35). Mellor also notes the connection between the figure of Newton and Michelangelo’s *Abias* (*Human Form Divine* 130), and Paley describes Newton as “Michelangelesque” (37).

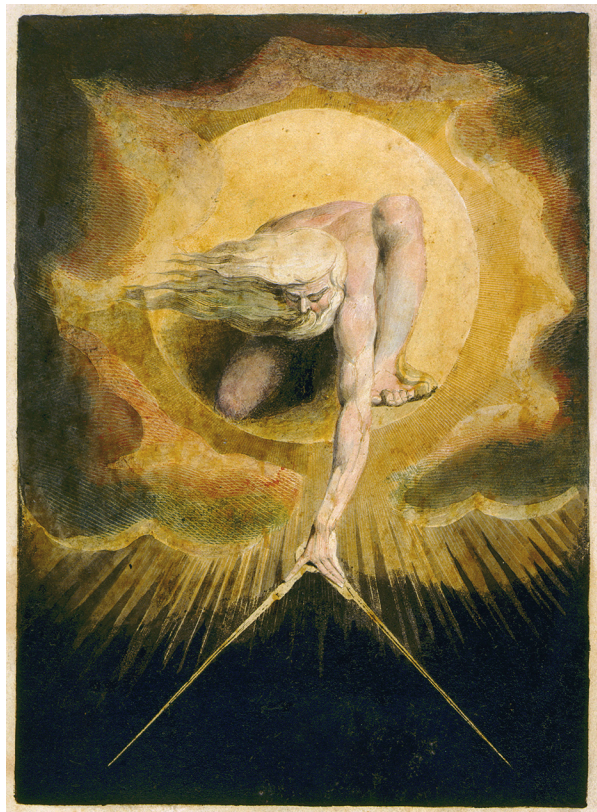
occupied with mathematical abstraction, that has brought his divine body to such a fallen state.

30 Blake’s positioning of Newton at the bottom of the ocean further ironizes his angelic physicality. As Butlin notes, the undersea setting is for Blake often a symbol of a limiting and limited materialist vision (*Paintings and Drawings* p. 167). This motif is previously evident, for instance, in the underwater depiction of Urizen (whose rigidly rational metaphysics and desire for “one Law” result in his fall) in plate 12 of *The First Book of Urizen* (illus. 10). In the 1804–05 color print, Newton has fallen from the heights described in Thomson’s poem to the marine floor, where he persists in imposing his mechanistic laws. Blake’s rendering of Newton’s body suggests that he could regain his angelic nature—in vital, material form—if he could abandon his mental fixation on abstraction.



10. Blake, *The Book of Urizen* copy G (c. 1818), pl. 12. 15.4 x 10.2 cm. Library of Congress. Image courtesy of the *William Blake Archive*.

31 Blake stresses Newtonian metaphysical imposition of order from above with the iconographic use of the dividers in the design. For Newton, since matter is inert and dead, form and order are imposed via a transcendent deity, as he writes in the second edition of the *Opticks* (1718): “It seems probable to me, that God in the Beginning form’d Matter in solid, massy, hard, impenetrable, moveable Particles, of such Sizes and Figures, and with such other Properties, and in such Proportion to Space, as most conduced to the End for which he form’d them” (Query 31, 375-76).⁵⁰ The dividers are an apt symbol for the deity’s (or deified Newton’s) division of the material from the spiritual during the act of creation. Blake had previously employed them to make a similar visual argument: plate b10 of copy L of *There is No Natural Religion* (1788) also features a man in a compromised position (crawling on all fours) using dividers to measure a triangle inscribed on the ground.⁵¹ The text accompanying this design is applicable to the *Newton* print: “He who sees the Infinite in all things sees God. He who sees the Ratio only sees himself only” (E 3).⁵² Likewise, Newton focuses only on the ratio of his geometric design; he is consumed by his own metaphysical system, which he mistakes for the lone reality, despite the evidence of the proliferating marine world around him. Blake also employed dividers in the now iconic “Ancient of Days” frontispiece to *Europe* (1794) (illus. 11), in which, as Butlin writes, “the Creator in the guise of Urizen imposes a rational order on the universe” (*Paintings and Drawings* p. 167).⁵³ Like Urizen, Newton is consumed and confined by the ratio of his law, blind to the creative potential of the material universe.⁵⁴



11. Blake, *Europe* copy E (1794), pl. 1. 23.4 x 16.9 cm. Library of Congress. Image courtesy of the *William Blake Archive*.

50. Earlier in the same query he claims that “even the Rays of Light seem to be hard Bodies And therefore Hardness may be reckon’d the Property of all uncompound’d Matter” (364). See Johnson for a discussion of Blake’s response to Newton’s argument for the particulate nature of light. Newton’s description of matter as fundamentally composed of inert, solid particles of various sizes and shapes is consistent with Epicurean atomism as elaborated by Lucretius; this is perhaps why Blake places Newton in such a tradition in his annotations to Reynolds’s *Discourses* (E 660). A significant difference, however, is that for Newton God created matter, which is eternal and uncreated in Epicurean metaphysics. For an account of how Newton eclectically borrowed from both Epicurean and Stoic philosophy, see Dobbs.

51. The crawling man also prefigures the posture of Nebuchadnezzar in the companion piece to *Newton*.

52. Hagstrum also connects the text on pl. b10 to *Newton* (“William Blake Rejects the Enlightenment” 73), as does Bindman (*Blake as an Artist* 100).

53. Hagstrum reads the design—and text—of pl. b10 of *There is No Natural Religion* as anticipating the frontispiece to *Europe* (*Poet and Painter* 78).

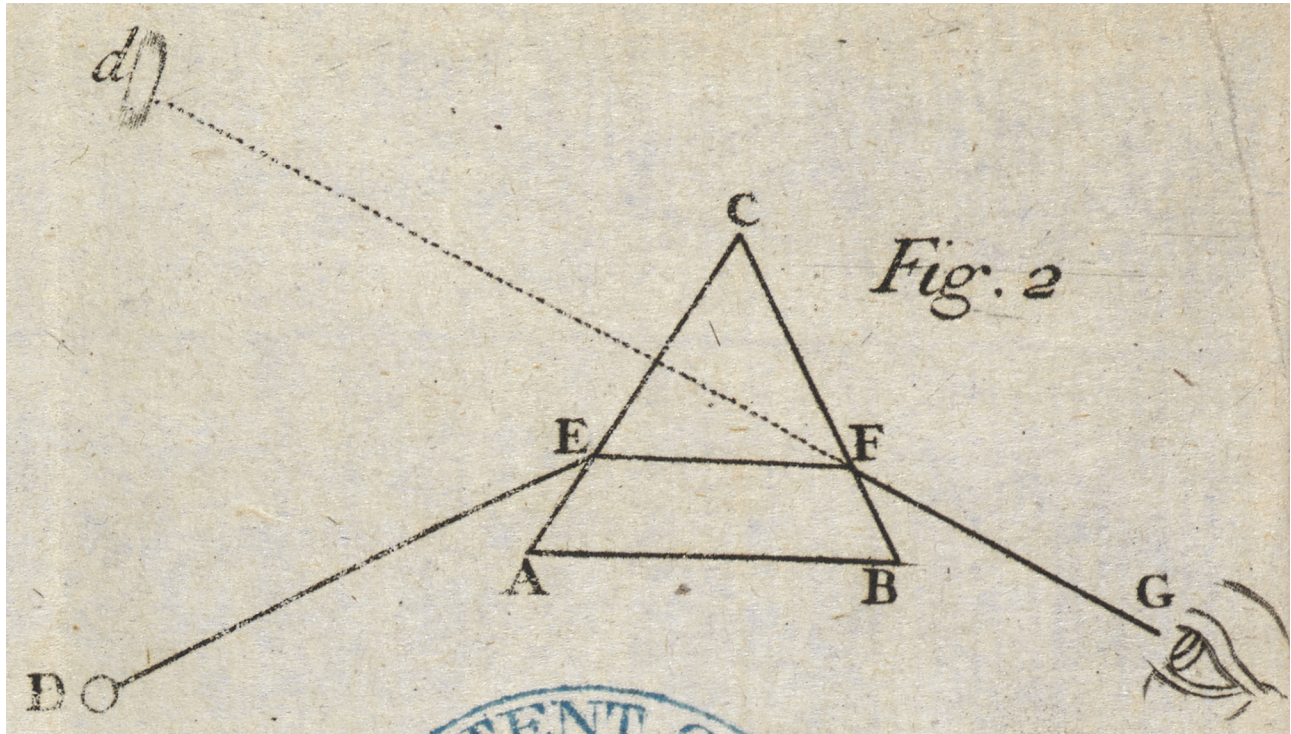
54. Dividers closely resemble another design tool, the compass, which has a stylus on one end for inscription; dividers lack a stylus and are used to measure or compare lengths in a drawing. Given the placement of the ends of the tool at two of the triangle’s vertices in the *Newton* print, it seems that Newton is measuring one of the sides, since a

32 Newtonian metaphysics also divides its fundamental massy, inert particles from the active gravitational forces responsible for the dynamism in the universe, as Blake’s use of the dividers suggests. For Newton, though these forces of attraction ultimately have God as their cause, divine activity operates on solid matter but does not inhere in it, as he makes clear in a letter of 1692–93: “Tis inconceivable that inanimate brute matter should (without ye mediation of something else wch is not material) operate upon & affect other matter without mutual contact” (*Correspondence* 3: 253). As John Yolton writes, Newton “emphatically rejected” the idea that such divinely caused forces could inhere in matter (92). There is thus in Newton’s view a strict distinction between inanimate material particles and the immaterial transcendent deity responsible for their motion. This ontology radically differs from the vitalist materialisms dis-

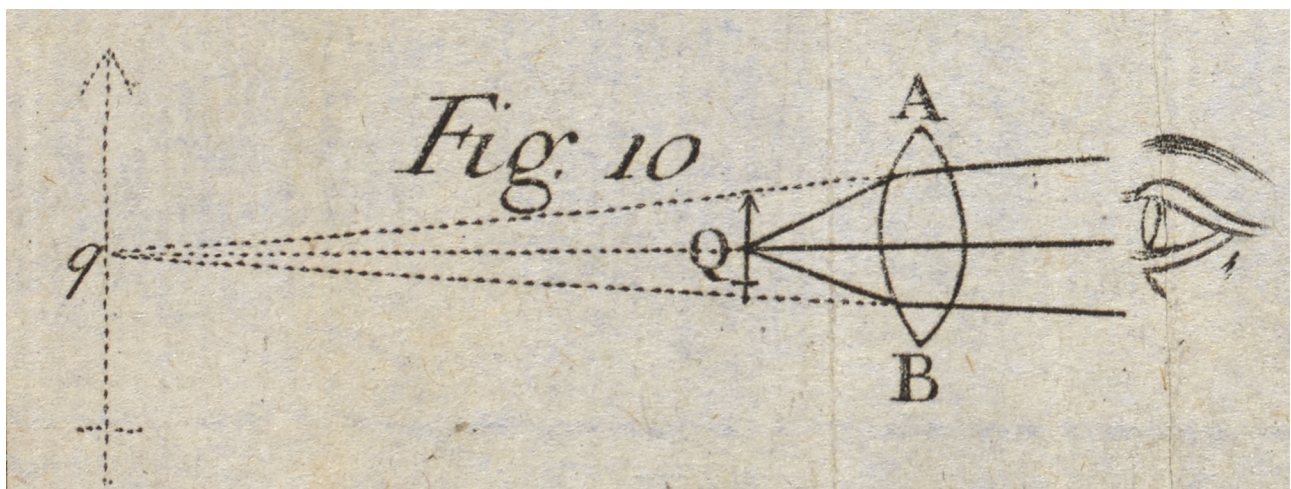
compass cannot be used to inscribe a triangle. (If he were using a compass to inscribe the arc within the triangle, the non-stylus end would be incorrectly placed.) In this regard I disagree with Blunt’s identification of the tool as a compass (“Symbolism of the Compasses” 61).

cussed above, in which matter immanently contains the active forces responsible for its regenerative and reproductive properties. As Dicquemare writes, these vitalist properties are immanent in every particle of the living organism: "The smallest particle of a living animal, has an organization which far exceeds every idea we can conceive of it" ("A Third Essay" 57). Such self-active and self-organizing particles are a far cry from the dead atoms of Newton's system.

33 By including the mathematical diagram in the later color print, Blake strengthens his ironic subversion of Newtonian mechanism. According to Gage, the diagram resembles figure 2 of the first part of book 1 of the *Opticks* (illus. 12). Figure 2 does indeed contain a triangle, observed from the lower right by the disembodied eye (with the browless eyebrow hovering above it) that appears in most of the illustrations to Newton's work. I argue, however, that the diagram



12 (above) and 13 (below). Newton, *Opticks*, 3rd ed. (1721), book I, par. I, tab. I, fig. 2, and book I, par. I, tab. II, fig. 10. Reproduced courtesy of the British Library. Images © The British Library Board, General Reference Collection DRT Digital Store 1609/5551.



in Blake's design corresponds more closely to figure 10 in the same work, which, in addition to the triangle, contains the same curved line that is found in Blake's diagram (illus. 13).⁵⁵ This line curves away from the disembodied eye, which looks at it; the resemblance between Newton's diagram and the conical side-view of the eyeball (conical because the eyelids meet to form the apex of the open triangle) with its inward curving line of the iris is explicit. The single eye visible in the profile of Newton in Blake's design also visually echoes the diagram on the sea floor. The lone eye, separated from its human form in the figures of the *Opticks*, suggests what Blake refers to in an 1802 letter to Butts as Newton's "Single vision" (E 722), and it is replicated in the color print in Newton's one eye and lone optical diagram. As Essick writes, "Newton is himself calculating the extent of his fallen vision as he measures the width of his pupil" ("Blake's 'Newton'" 158). One would need only to close the right side of the triangle in Newton's figure 10 to reproduce what Blake depicts. The fact that Blake has closed the triangle—in effect blocking the eye's capacity for vision—further reinforces the limited nature of Newtonian vision.

34 Blake's setting Newton and the reef against a background of obscure undersea gloom, indicated by the marine greenish-blues above and to the right of the natural philosopher's head in the 1804–05 print, also parodies Newton's own description of his experiments in the *Opticks*. In order to discern the mathematical properties of light, he shut himself in dark rooms with his prism, allowing only a *single* small hole for light to enter: "And, the Sun shining into my dark Chamber through a little hole in the Window-shut, I placed [the prism]" (47).⁵⁶ Blake's design emphasizes this aspect of the Enlightenment hero: he spent a lot of time in the dark. And if Newton seeks to understand the sun, Blake portrays him facing the wrong way, in thrall to a diagram of his own creation.⁵⁷ His downward-focused gaze suggests a perverted form of worship and recalls Blake's later claim, in the annotations to Berkeley's *Siris*, that "God is not a Mathematical Diagram" (E 664).

35 I stress a contrast between Newton's philosophy and the coralline universe by which he is surrounded, while the few critics who have commented on these aspects of the later color print more often attempt to equate Newton with the polypus. Essick, for instance, writes that the creature is "a pictorial embodiment of a symbol which in Blake's poetry describes the world created when man falls from divine vision into material perceptions Newton is fittingly por-

trayed as the inheritor of some of Blake's major images for the limited world created by that vision" ("Blake's 'Newton'" 156). Similarly, Engelstein claims that "the polypus is a monster of Newtonian materialism, the consequence of a failure of imagination," revealing "the danger implicit in the failure of scientific objectivism to recognize complicity in its conclusions" (102).⁵⁸ As for Engelstein's first claim, I argue that the vital polypus operates in opposition to Newtonian materialism—it is not a monster of such a worldview, but a monstrous and shadowy threat to it. The unchanging laws of Newton's philosophy are better symbolized by the stony structure in the 1795 print—with its connotations of the tomb and death, a motif also evident in the title page of *Urizen*—than by the dynamic living coral in the 1804–05 revision.⁵⁹

36 Discussing Newton's body and the coralline organisms surrounding him, Mitchell writes, "What the picture really shows us, however, is the 'swerve' between two antithetical conceptions of the world, depicted as contrasting regions" (456). However, as his title, "Chaosthetics," indicates, Mitchell is more concerned with the contrast between chaos and order, specifically as it is manifested in Blake's artistic method (reticulated paint bounded by an imposed line); I, on the other hand, am emphasizing the metaphysical contrast of vitalism with mechanism. Additionally, I argue for a contrast between the diagram and the polypus, which I take to be more fundamental than the contrast that

58. Additionally, Raine writes, "Blake saw in this soulless vegetation the same error at work that produced Newton's soulless physics" (1: 241). The only eighteenth- or early nineteenth-century text linking Newton and the polyp is *The Newtonian System of Philosophy Adapted to the Capacities of Young Gentlemen and Ladies, and Familiarized and Made Entertaining by Objects with Which They Are Intimately Acquainted* (1761), the title page of which indicates that the work is a collection of lectures delivered by "Tom Telescope" to the "Lilliputian Society," collected and published by John Newbery. The work went through nine editions between 1761 and 1798, and in it "Master Telescope, a young Gentleman of distinguished abilities," asks his classmates, "is it not ... miraculous, that if some animals are cut in pieces, every separate piece ... of the original animal will become one entire animal of itself? Yet that the *polype* or *polypus* is endowed with this property has been demonstrated" (2, 93–94). Telescope then invites his peers to view such regenerated polyps through a microscope, though he fails to explain exactly how this property accords with the "Newtonian System" indicated in the work's title.

59. I do not mean to imply that the polypus should be taken as a positive emblem of artistic creation. As Miner and others have shown, such a claim cannot be substantiated when considering passages elsewhere in Blake's work, such as pl. 34 of *Milton*, where Ulro is characterized as a polypus of "living fibres" that is "self-devouring" and "monstrous." I am suggesting that in the context of the 1804–05 *Newton*, the polypus is emblematic for Blake of a vitalist philosophical system—elaborated by La Mettrie, Buffon, and Darwin—that cannot be contained within a Newtonian mathematical and mechanistic worldview.

55. All editions of the *Opticks* contain these figures.

56. He refers to his "dark Chamber" twelve other times in this edition.

57. Kostelanetz also makes this claim: "The limited vision of Newton is further emphasized by the fact that he looks *downward* rather than up to heaven" (126).

Mitchell emphasizes between the “enamel-like clarity” of Newton’s naked body and the richly textured vegetation of the “aquamarine atmosphere” surrounding him (455). He goes on to suggest that, like the coralline polyps, Newton also excrementally contributes to the growth of the reef on which he crouches: “Newton must be seen as sitting on—indeed, inhabiting as his ground and dwelling place—a gorgeous mound of excrement that he himself has produced” (457).⁶⁰ However, if Newton’s body exhibits polyp-like properties, he is not behaving like one in all respects, since contemporary accounts stressed the fact that the polyp had a distinct propensity for facing the sun, unlike Newton in Blake’s design.⁶¹

37 As the disembodied eye in the figures of the *Opticks* suggests, Newton’s abstract mathematical system is divorced from the material reality of both the coralline creatures’ and his own living form. I argue that it is this separation that Blake’s later design critiques.⁶² Ault writes that Blake objected to Newton because of the latter’s attempt to reify subjective metaphor in the form of mathematics: “Newton’s system is a substitute for Imaginative organization” (162). In the 1804–05 print Newton’s system is represented by the idealized and idolized geometric diagram of the eye, not by the body of the philosopher, which is connected (according to the flat ontology implied by the living matter in the systems of La Mettrie, Buffon, and Darwin) to the living and foliating coralline structure around him. In his limited and limiting concentration on an externalized mathematical form, which is positioned below both his body (he is partially stepping on his drawing) and the coral reef, the natural philosopher neglects the vital and non-mechanistic properties of his own divine body. For Blake, that body is the highest form of the living universe, contrasting in appearance with but integrally connected to the corallines.⁶³

60. Engelstein also discusses Newton’s attachment to the coral: “Blake’s figure of Newton, which resembles Los in his youth, strength, and muscular definition, remains, like each individual polyp, anchored by his foot to the coralline surface on which he sits” (104). Focusing on the excremental nature of coral formation, Mitchell bolsters his claims with the writings of Georges Bataille, who is fascinated with excess and those forces—whether of sex, violence, or death—that resist orderly containment. The shadowy, prolific, unclassifiable polyp would be an appropriate subject for Bataille’s philosophy, and Mitchell stresses the fact that Newton is unknowingly shitting the reef on which he sits.

61. See, for instance, “Description of the Common Polypus” in the *Ipswich Magazine* of 1799: “All animals of this kind have a remarkable propensity to turn towards the light” (69).

62. The image, then, is a variant of Blake’s theme of the dangers that ensue when systematizers—like Newton—“realize or abstract the mental deities from their objects” (*The Marriage of Heaven and Hell*, E 38).

63. Dickey likewise makes connections between the vital tissue of the sea anemone and that of the human body. In considering the irritability and sensitivity of all parts of the marine organism, he hints

38 In modifying the 1795 color print of *Newton*, which had equated Newton and his philosophy with the rocky form on which he sits, Blake was able to make a strikingly ironic and more complex visual argument. This argument drew on a vast discourse concerning vitalism as an anti-Newtonian philosophy of life, a discourse whose emblematic organism in the eighteenth century was the polyp. Placing Newton at the bottom of the ocean drastically inverts the tradition of elevation and deification that had been occurring for a century. Hunched in the submarine depths, blindly consumed by his mathematically abstracted system, Newton in Blake’s later print is a dark parody of his reputation as a Promethean bringer of light, and Blake’s inclusion of the diagram resembling figure 10 of the *Opticks* adds a further level of irony. By radically transforming the rock of the 1795 print into the living coralline mass in the later version, he presents a powerful contrast between the Urizenic rigidity and transcendent imposition of Newtonian mathematical mechanism—represented by the diagram—and the vital, immanently generative polypus, with which Newton’s own body has more in common. While both the polypus and the mathematical laws may be products of a fallen world, only the polypus is capable of transformation, unlike the oppressive and unchanging Newtonian law, which is insufficient to explain the vital properties of lions, oxen, and all other dynamic forms of life.

that the same might be true of the human body: “The nerves seem to be the chief, perhaps the only, organs of sensibility in man, and the muscular fibres to be the principal seat of irritability; yet how many are the doubts entertained concerning the parts that are and are not endowed with one and the other!” (“A Second Essay” 209). He asks, “Might not the rapid and singular reproduction of the parts of this animal [the sea anemone] be attributed to their gelatinous texture? and if so, may we not reasonably conclude, that the reproduction of our vascular and fleshy parts in the consolidation of wounds is in great measure owing to such a gelatinous matter” (209-10). His third essay goes further, comparing the “gelatinous” appearance and texture of the sea anemone to that of the human brain: “Shall we suppose that the gelatinous matter [of the sea anemone] is nothing but an irregular, incoherent substance? At first sight the same might be said of the white substance of the brain, although it seem [*sic*] to have more consistency; yet in many places it appears fibrous, and if we could trace it through the nerves, we should no doubt discover a most admirable organization” (75).

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