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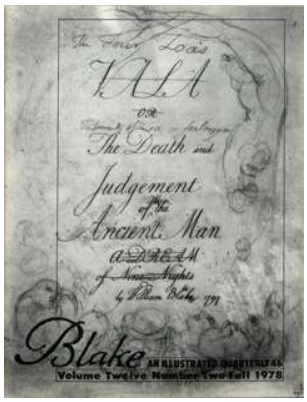


THE SWEET SCIENCE OF ATMOSPHERES IN *THE FOUR ZOAS*

NELSON HILTON

And all the time in Caverns shut, the golden Looms erected
First spun, then wove the Atmospheres, there the Spider & Worm
Plied the wingd shuttle piping shrill thro' all the list'ning threads
Beneath the Caverns roll the weights of lead & spindles of iron
The enormous warp & woof rage direful in the affrighted deep

While far into the vast unknown, the strong wing'd Eagles bend
Their venturous flight, in Human forms distinct; thro darkness deep
They bear the woven draperies; on golden hooks they hang abroad
The universal curtains & spread out from Sun to Sun
The vehicles of light, they separate the furious particles
Into mild currents as the water mingles with the wine.

While thus the Spirits of strongest wing enlighten the dark deep
The threads are spun & the cords twisted & drawn out; then the weak
Begin their work; & many a net is netted; many a net
Spread & many a Spirit caught, innumerable the nets
Innumerable the gins & traps; & many a soothing flute
Is form'd & many a corded lyre, outspread over the immense
In cruel delight they trap the listeners, & in cruel delight
Bind them, condensing the strong energies into little compass
Some became seed of every plant that shall be planted; some
The bulbous roots, thrown up together into barns & garners

(29.2-30.7)[1]

This passage, a type of the cosmogonic moment variously presented by Blake, has largely been passed over in the silence accorded self-evident meaning, or when discussed, glided through with such selective paraphrase and assured comment as to belie any but an undemanding significance.[2] The three sections present a nearly simultaneous temporal unity ("And all the time. . . . While. . . . While") strongly grounded in a sequence of interrelated images, already suggesting to the painstaking reader that the passage is structured around a coherent underlying meaning.

A first reading reveals that the Atmospheres are woven, spread through space and then reintroduced as a spirit-catching and spirit-condensing net. In the first of two brief notes on the passage (E 871), Bloom answers the strangeness of the "first spun, then wove" Atmospheres with a reference to *Paradise Lost* 7.241, where God "spun out the Air." Milton was only one of the first to use what became a standard and sometimes very involved eighteenth-century image of the woven "fabric" or "texture" of air. Blackmore's popular *The Creation* (1712) set the tone:

Vala or The Four Zoas, p. 29. London, British Museum.

7 15 ~~14~~

That Luvah rent from the fair Heart of the Fallen Man
And weigh the mighty Globes, then fix them in their awful stations

And all the time in Caverns shut, the golden Looms erected
First spun, then wove the Atmospheres, there the Spider & Worm
Plied the winged shuttle piping shrill thro' all the listening threads
Beneath the Caverns roll the weights of lead & spindles of iron
The enormous warp & woof rage dreadful in the affrighted deep

While far into the vast unknown, the strong winged Eagles bore
Their venturous flight, in human forms distinct; thro darkness deep
They bear the woven draperies, on golden hooks they hang abroad
The universal curtains & spread out from Sun to Sun
The vehicles of light, they separate the furious particles
Into mild currents as the water mingles with the wine.

While thus the Spirits of strongest wing enlighten the dark deep
The threads are span & the cords twisted & twain out; then the weak
Begin their work; & many a net is netted, many a net
Spread

Remark the air's transparent element,
Its curious structures, and its vast extent:
Its wondrous web proclaims the loom divine;
Its threads, the hand that drew them out so fine.
This thin contexture makes its bosom fit,
Celestial heat and lustre to transmit;

(2.618-23)[3]

The scientific exactitude of "Atmospheres" calls attention to the figurative loom in which they were woven. The formula "Looms erected" recalls an image fifteen lines earlier where the Children of Man, "schools Erected forming Instruments / To measure out the course of heaven" (28.20-21).[4] The looms are the schools of warped thought, an image presented more explicitly in *Jerusalem*, where

I turn my eyes to the Schools & Universities of Europe
And there behold the Loom of Locke whose Woof rages dire

(15.14-15).

The Caverns then, as the site of this mental manufacture, contain the mind-loom in its perceptual and physical shell.[5] "Beneath" the caverns is without, the vast unknown of the unconscious. *The Marriage of Heaven and Hell* presents a similar transition: "an Eagle with wings and feathers of air, he caused the inside of the cave to be infinite" (pl. 15). This mental space was entered by Er at the end of the *Republic* in one of the earliest journeys through the unknown. There he saw "the light which binds heaven" and, hanging from its extremities, "the spindle [atraktos] of Necessity" and its "weight" [sphondulos] (616c ff., cf. *Milton* 35.14-15). The "Atmospheres" offer a later instance of that myth. Ostensibly as natural as the air we breathe, the "Atmospheres" are in fact woven by "the Spider," known for his entrapping web of thought, and the "Worm," who otherwise spins the veiling cocoon of "silken thought" (cf. *Night Thoughts*, 1.157-58).

The close proximity of the formulaic "wingd shuttle" to the "wing'd Eagles" intimates that those "Human forms" are being manipulated by the "Spider" and "Worm," an impression strengthened by the fact that the Eagles "bend," where those weavers "plied"--a very rare verb for Blake, a significant meaning of which was "to bend."[6] Both shuttle and Eagles are moving back and forth filling up space. These eagles suggest the great scientists of the century, like Halley and Newton, who, even in life, were very commonly presented as pursuing extra-mundane, cosmic voyages of intellect.[7] Here Blake sees them drawing their threads or theories of aethereal atmosphere behind them--bringing not light, but darkness visible. This point is confirmed by the application of the remaining three instances of "venturous" to the spider-scientist Urizen, whose "dire Web / Followd behind him" (73.31-32)[8] in his exploration of the Abyss at the end of Night the Sixth (also the only Night where "the vast unknown" reappears):

Creating many a vortex fixing many a Science in the deep
And thence throwing his venturous limbs into the vast unknown

(72.13-14)[9]

The "woven draperies" they bear must be the woven Atmospheres of the previous section, now expanded to "The universal curtains" and "the vehicles of light." These curtains cannot fail to bring to mind Urizen's "woven darkness" in *The Song of Los* (7.25) or those created by the Eternals in *The Book of Urizen* in order to "bind in the Void" and close the fallen worlds from their sight:

12. They began to weave curtains of darkness
They erected large pillars round the Void
With golden hooks fastend in the pillars
With infinite labour the Eternals
A woof wove, and called it Science

(19.5-9)

This work parallels the Lord's instructions to Moses that His temple is to be furnished with pillars and hooks of gold from which to hang "the vail that shall divide unto you between the holy place and the most holy" (Ex. 26:32, 33, et al.). In Night the Second the golden hooks are suns. The woven Atmospheres/curtains which serve also as "the vehicles of light" suggest Newton's formulation of "an ethereal medium, much of the same constitution with air, but far rarer, subtler, and more strongly elastic" (Cohen, p. 179). *The Book of Los* speaks of "Light. . . . conducted by fluid so pure" (5.10-11).

Atmosphere is both woven and fluid at the same time. Its aethereal nature blends into "particles" and "currents," the proper combination of corpuscular and wave theory: "A ray of light is a continued stream of these particles."[10] Water mingling with wine offers a theoretical illustration similar to that of Grimaldi in his *Physico-Mathesis de Lumine*, where "He was led to conclude that light did not go through diaphanous material by direct penetration but rather in an indirect manner . . . . like wine in water."[11] Note the direction of dilution: the wine of light is being watered, but water requires spiritual transformation to turn to wine. On the other hand, this same aethereal atmosphere was seen as being composed of invisible threads by which light was transmitted. Blackmore explained:

The ever-rolling Orb's impulsive Ray
On the next Threads and Filaments does bear,
Which form the springy Texture of the Air,
. . . these still strike the next, till to the Sight
The quick Vibration propagates the Light;

(2.401-05)

Henry Brooke's *Universal Beauty* described the air, "Its mantle wove of elemental threads," which, invisible, "enfolds the sphere."[12] "The various

twine of light" was untwisted by Newton in Thomson's famous image ("Spring," 211), and Erasmus Darwin speaks simply of "the sevenfold threads of light."[13] The curtains woven from these imagined threads appear to be diaphanous--just so the Inhabitants in *The Book of Urizen*

> Discernd not the woven hipocrisy
> But the streaky slime in their heavens
> Brought together by narrowing perceptions
> Appeard transparent air
>
> (25.32-35)

The third section returns to the initial spinning as "The threads are spun & the cords twisted & drawn out" which the weak, having "power to resist energy" (MHH 16), make into "many a net." The twisted cords offer another evocation of *The Book of Urizen*, pl. 25, which describes Urizen's spider-web (25.10 ff.), concluding

> 8. So twisted the cords, & so knotted
> The meshes: twisted like to the human brain
>
> 9. And all calld it, The Net of Religion.
>
> (25.20-22)

The nets are identified with the curtains and Atmospheres, not only being made from the same material (in turn, "like to the human brain"), but, like the draperies they are "Spread . . . outspread over the immense."[14] Blake draws attention to the luminescent component of the image by twice repeating in a single line the "cruel de*light*" of these activities. The nets of the weak "trap the listeners" and catch "many a Spirit," condensing their "strong energies." The Spirits caught are evidently those same "strong wing'd Eagles. . . . spirits of strongest wing" that originally spread the curtains (now nets), while the trapped listeners are those "list'ning threads" through which the wingd shuttle plied. So the spirits are bound in the web they thought to spread and the listeners are woven into what they heard.

The listeners hear the "chords" of "nature's harmony," like the entrancing unheard musical air of the spheres. At the Wedding Feast of Nature, Los and Enitharmon "listend to the Elemental Harps & Sphery Song" (13.1) presented by the "Bright Souls of vegetative life" (13.24). But in Night the Second the flute and mendacious lyre are instruments ("schools Erected forming instruments") playing a seductive, fallacious harmony. In Night the Fourth Tharmas compells Los to "choose life":

> And all the Elements shall serve thee to their soothing flutes
> Their sweet inspiriting lyres thy labours shall administer
>
> (52.3-4)

This single instance of "inspiriting" indicates that the lyres are to do more than "uplift moods." Los must play the lyre to draw spirits into the furnaces of Urizen he is rebuilding; their bound energy is necessary to fuel his work of constructing the fallen world.

The passage from Night the Second concludes with the unexpected information that the spirits are condensed "into little compass / Some became seed of every plant . . . some / The bulbous roots . . . " It is a striking conclusion to the sequence of events that began with the weaving of the Atmospheres. One such process of condensation was evident in *The Book of Los*, where the prophet caught the spiritual light to make the "glowing illusion" of the mundane sun:

> 4: And first from those infinite fires
> The light that flow'd down on the winds
> He siez'd; beating incessant, condensing
> The subtil particles in an Orb.
>
> (5.27-30)

The illustration shows that sun to be "black but shining" (SL 8, MHH 18). Urizen reveals in Night the Sixth that when "death" shuts up his powers, he is "then a seed in the vast womb of darkness" (73.8-9)--misremembering his ruined furnaces and "stoned stupor" of Night the Fourth.

It was probably in 1789, at the height of his involvement with The New Jerusalem Church, that Blake read and extensively annotated Swedenborg's *The Wisdom of Angels concerning Divine Love and Divine Wisdom* (London: W. Chalklen, 1788). One of the principal motifs of the book is the descending correspondence running from "the Lord" to the "spiritual sun" to the "natural sun." Divine Love and Divine Wisdom "appear in the spiritual world as a Sun" (no. 83, p. 69) and from that sun proceed a corresponding "spiritual Heat and spiritual Light" (no. 290, p. 264).[15] The "assertion that the spiritual Sun is not Life" (e.g., according to Swedenborg it is from the Lord but not the Lord, so "not Life in itself") annotated Blake, "explains how the natural Sun is dead" (p. 268). In addition to the Lord's presenting himself "as to Love by Heat, as to Wisdom by Light," Swedenborg adds another correspondence, that of "use," presented "by the Atmosphere" (no. 299, p. 271). Atmosphere is invoked because it is "the Continent of Heat and Light" as Use is "Of Love and Wisdom" (ibid.). Thus the Atmosphere is the necessary element "by means of" which the Spiritual Sun "produces the varieties of all Things in the created Universe" (no. 300, p. 273). There are three Atmospheres in both the Spiritual and Natural Worlds, which "in descending decrease," that is, "become continually more compressed and more inert" until "they are no longer Atmospheres but Substances" (no. 302, p. 274). Swedenborg reiterates that "the Substances and Matter, of which Earths consist . . . are, as it were, the Ends and Terminations of the Atmospheres" (no. 305, p. 277). These substances, however, still "have brought with them by Continuation from the Substance of the spiritual Sun that which was there from the Divine" and as a result continue to manifest "a perpetual Endeavour to produce Forms of Uses" (no. 310, p. 280). "The

first Production of those Earths, when they were still recent, and in their Simplicity, was the Production of Seeds" (no. 312, p. 283). The Seeds, in turn, become an "image of creation" moving from their "first Principles to their Ultimates," a movement characterized in Blake's annotation as "A Going forth & returning" (p. 285), a perception which underlies his whole work. "This World is too poor to produce one Seed," Blake wrote in the margins of Reynold's *Discourses on Art* (E 646), and returning to the image in *The Four Zoas*, we see that the effect of the Atmosphere is to catch the Spirits of the Spiritual Sun and condense them into seeds.

Having worked through this involved spiritualist account some may be surprised to discover that Newton was of the same mind. Indeed it is evident that Swedenborg adapts material he would surely have come across in his wide scientific reading. In the "Second Paper on Light and Colours," not fully printed until 1757 but known since its presentation in 1675,[16] Newton begins by supposing that the "aethereal medium" is "compounded, partly of the main phlegmatic body of aether, partly of other various aethereal spirits, much after the manner, that air is compounded of the phlegmatic body of air intermixed with various vapours and exhalations: for the electric and magnetic effluvia, and gravitating principle, seem to argue such variety" (Cohen, p. 180). Blake knew these "spirits" as "Devils. . . . Powers of the Air" and remarked, "the air was full of them, & seemd composed of them" (MHH 18). Newton continues:

> Perhaps the whole frame of nature may be nothing but various contextures of some certain aethereal spirits, or vapours, condensed as it were by precipitation, much after the manner, that vapours are condensed into water, or exhalations into grosser substances, though not so easily condensible; and after condensation wrought into various forms; at first by the immediate hand of the Creator; and ever since by the power of nature; which, by virtue of the command, increase and multiply, became a complete imitator of the copies set her by the protoplast. Thus perhaps may all things be originated from aether.
>
> (Cohen, p. 180)

In one of the last "Queries" added to the *Opticks* Newton limited himself to suggesting that "The changing of Bodies into Light, and Light into Bodies, is very conformable to the Course of Nature, which seems delighted with Transmutations."[17]

These two accounts may mark the distinction between "Science" and "Sweet Science" which operates in *The Four Zoas*. Newton withheld his idea from publication; "The fact is," observes E. A. Burtt, "Newton's positivism was powerful enough to prevent his carrying his speculations very far in this direction."[18] This for Blake is "Science," the suspension of belief and emphasis on doubt in the interests of the profitability and utility of experimental results. Swedenborg, on the other hand, though he "has not written one new truth" (MHH 22) is a practitioner of the "Sweet Science" of belief and imaginative relation to the world. The distinction, ultimately, has to do with the place of man in the scientific endeavor; for Newton, "Man exists to know and applaud" (Burtt, p. 297) the order of the God of Nature in His unchanging laws, whereas for Blake the Imagination is to realize itself as the Being that instituted Nature and continually bodies forth new creations. The use of the term "Science" for both endeavors shows that the two will eventually be one.

Both Newton and Swedenborg say that the aethereal condenses in the atmosphere, so that the physical world is, literally, *spiritual*. But while Newton imagines no purpose for the "transmutations," Blake sees in Swedenborg a vision of "a going forth & returning," the circulating, spiraling, expanding movement of the imagination. At the close of the atmospheric moment in Night the Second some of the Spirits are shown condensed into seed to be sown, others condensed into roots, already harvested and stored in "barns & garners," the "store house" of thought (cf. 110[1st].12-13). The seeds may be new thoughts--spiritual energy and enlightenment caught up in an image that will grow and bear--as the roots may be accomplished thought, the organic base for further visions which, Blake says, are always of "somewhat on earth."[19] "The Imaginative Image," writes Blake, "returns by the seed of contemplative Thought" (VLJ, E 545; cf. J 85.27-29). In *The Four Zoas* it is the passage through atmosphere that materializes the image.

Blake reintroduces Swedenborg's three atmospheres in Night the Seventh (a). Los builds Golgonooza in "the nether heavens" where "new heavens & a new Earth" have opened. They are "Threefold within the brain within the heart within the loins" (87.10) and so represent, "A Threefold Atmosphere Sublime continuous from Urthonas world" (87.11) or the second of the threefold atmospheres of Swedenborg's Spiritual and Natural Worlds, arranged in the traditional hierarchy of elemental (loins), celestial (heart), and intellectual (head).[20] This second, natural Atmosphere has a "Limit Twofold named Satan & Adam" (87.12), or Opacity (cf. 56.19) and "Translucence" (87.13, sometimes called "Contraction"). These two limits were in a sense present in the two aspects of the Atmospheres: vehicles of light and condensing net. The medium of these two limits is itself the limit to perception through it. But this atmosphere also provides a necessary secure space in which to sleep and grow:

> And we are put on earth a little space,
> That we may learn to bear the beams of love,
>
> "The Little Black Boy," 13-14

"The Natural Earth & Atmosphere," Blake wrote in his annotations to *Divine Love and Divine Wisdom*, "is a Phantasy" (p. 285). The real atmosphere, to use the metaphor the OED first dates at 1797-1803, is the mental one (s.v. "atmosphere," 4). Young agreed:

. . . fine spun Air?
Fine spun to sense; but gross and feculent
To Souls celestial. . . .

(*Night Thoughts*, 6.140-42)

One of the Eternals at their Feast in Night the Ninth describes the netting of Spirits from the Eternal point of view. When man is wearied, "Folding the pure wings of his mind . . . Abstracted from the roots of Science [*Nature* del.]" (133.14-15), then the Eternals "cast him like a Seed into the Earth" (133.16). According to *The Book of Ahania*, the Spirit is cast "On the Human soul" as "The Seed of eternal Science" (5.33-34). Toward the end of the Night the golden looms and wingd shuttle appear for the second time in the poem:

Then Enion & Ahania & Vala & the wife of Dark Urthona
Rose from the feast in joy ascending to their Golden Looms
Where the wingd shuttle Sang the spindle & the distaff & the Reel
Rang sweet the praise of industry.

(137.11-14)

There they fabricate bodies for the spectres, the spirits that the Eternal Man casts into "the world of shadows thro the air" (137.31; cf. 100[1st].2 ff.). The woven atmosphere is one medium of materialization, one instance of the "wide woof" which flows from the looms down into the Chasms "where the Nations are gatherd together" (137.17). These references converge at the end of the poem where "The Sun has left his blackness" (138.20) and

The Sun arises from his dewy bed & the fresh airs
Play in his smiling beams giving the seeds of life to grow
And the fresh Earth beams forth ten thousand thousand springs of life

(139.1-3)

The sun perceptible is now the spiritual sun, and the earth itself is luminous with the fresh airs of "sweet Science" sweeping away the stale atmosphere of binding "dark Religions" (139.10).

[1] Blake references are to David V. Erdman, ed., *The Poetry and Prose of William Blake*, 3rd printing rev. (Garden City, N.Y.: Doubleday, 1968); here pp. 312-13.

[2] D. J. Sloss and J. P. R. Wallis remarked in their edition (speaking specifically of the second verse grouping) that, "This passage presents some difficulty, if, as elsewhere . . . a definitely mental significance is to be read into this myth. For it is impossible to reconcile the intellectual light with the obscurantism denoted by Urizen himself, and manifested in the creation of his new world. It may be therefore that the reference is to the light of the sun, not to mental light"; *The Prophetic Writings of William Blake* (Oxford: Clarendon, 1926), I, 180 n. Milton O. Percival states simply that "The looms weave the spiritual clothing"; while, on the other hand, "The net of the moral law is beginning to take shape"; *William Blake's Circle of Destiny* (1938; rpt. New York: Octagon Books, 1970), p. 63. Erdman sees "the caverns of manufactory" where children are represented by "silkworms" and spiders, and notes the appearance of Blake's "favorite theme, the spinning and twisting by the weak of the 'gins & traps' of Church and State propaganda"; *Blake: Prophet Against Empire*, rev. ed. (Garden City, N.Y.: Doubleday, 1969), pp. 335-36.

[3] Richard Blackmore, *The Creation: A Philosophical Poem in Seven Books*, in *The Works of the English Poets. with Prefaces, Biographical and Critical by Samuel Johnson*, vol. 24 (London: J. Nichols et al., 1779).

[4] Night the Second, with half of Blake's ten uses, is the center for things "erected"; four pages earlier the Bands of Heaven "the loom erected" (24.10) next to "golden compasses, the quadrant" and other technical instruments, and "They erected the furnaces" (24.13). Shortly after the passage under discussion, the goal of all the preceding, "the Altar . . . was Erected" (30.38-42).

[5] "Caverns," moreover, glance at the received idea that the atmospheres were made underground: ". . . by the continual fermentations made in the bowels of the earth there are aerial substances raised out of all kinds of bodies, all which together make the atmosphere," wrote Newton; I. Bernard Cohen, ed., *Isaac Newton's Papers and Letters On Natural Philosophy and related documents*, assisted by Robert E. Schofield, with explanatory prefaces by Marie Boas, Charles Coulston Gillispie, Thomas S. Kuhn, and Perry Miller (Cambridge, Mass.: Harvard Univ. Press, 1958), p. 253. Chamber's *Cyclopedia* defined "atmosphere" as that part of air "which receives vapours and exhalations" (1751, OED). In Night the Ninth, Urizen and family "pourd their light / To exhale the spirits of Luvah & Vala thro the atmosphere" (131.33-34).

[6] Ply, "bend," and ply, "employ," are distinct verbs; the former, although now rare, rates an entry half the length of the latter in the OED.

[7] William Powell Jones quotes a number of examples in his *The Rhetoric of Science: A Study of Scientific Ideas and Imagery in Eighteenth-Century English Poetry* (Berkeley & Los Angeles: Univ. of California Press, 1966), pp. 99-103; see also Marjorie Hope Nicolson, *Newton Demands the Muse: Newton's "Opticks" and the Eighteenth Century Poets*, Princeton Paperback (1946; rpt. Princeton: Princeton Univ. Press, 1966), p. 68. One high point of the tradition is Wordsworth's image of Newton as "a mind for ever / Voyaging through strange seas of Thought, alone" (*Prelude* 3.62-63).

[8] This web can represent a different aspect of perceptual entrapment, based on schematic diagrams of the solar system.

[9] The variant form describing "the ventrous feet / Of Urizen" (FZ 125.12-13) associates venturing with "giving birth" via "venter," the womb, and the spectre's podalic birth (FZ 5.15). "Venturous" also represents one of Urizen's many associations with Milton's Satan (cf. PL 5.64, 9.690) and his flight through the Abyss.

[10] "Optics," *Encyclopedia Britannica*, vol. III (Edinburgh: A Bell, 1771).

[11] Vasco Ronchi, *The Nature of Light, An Historical Survey*, trans. V. Barocas (London: Heinemann, 1970), p. 135.

[12] Cited in Nicolson, p. 68.

[13] *The Botanic Garden; A Poem, in Two Parts. Part I containing The Economy of Vegetation. Part II, The Loves of the Plants. with Philosophical Notes* [10 plates engraved by Blake] (1791; rpt. Menston, Eng.: Scholar Press, 1973); *The Loves of the Plants*, I.118, p. 10. In *The Temple of Nature* (London: J. Johnson, 1803) Darwin was to see in "threads" an even more basic unit of life:

Last, as fine goads the glutton-threads excite
Cords grapple cords, and webs with webs unite;
And quick CONTRACTION with ethereal flame
Lights into life the fibre-woven frame.--
Hence without parent by spontaneous birth
Rise the first spects of animated earth;
. . . . . .
Life's subtle woof in Nature's loom is wove;

(I.243-48, 252)

This was published, presumably, after Night the Second was written. Darwin used analogous imagery of the origin of life from "a simple living filament" in his prose study, *Zoonomia; or The Laws of Organic Life* (London: J. Johnson, 1794), I, 489-98.

[14] Donne saw a different kind of mental net:
For of Meridians, and Parallels,
Man hath weav'd out a net, and this net throwne
Upon the Heavens, and now they are his own.

("The first Anniversary," 278-80)

[15] Cf. "The Little Black Boy":
Look on the rising sun: there God does live
And gives his light, and gives his heat away.

(11. 9-10)

Blake told Crabb Robinson that he had seen "the Spiritual Sun" on Primrose Hill (G. E. Bentley, Jr., *Blake Records* [Oxford: Clarendon, 1969], p. 541).

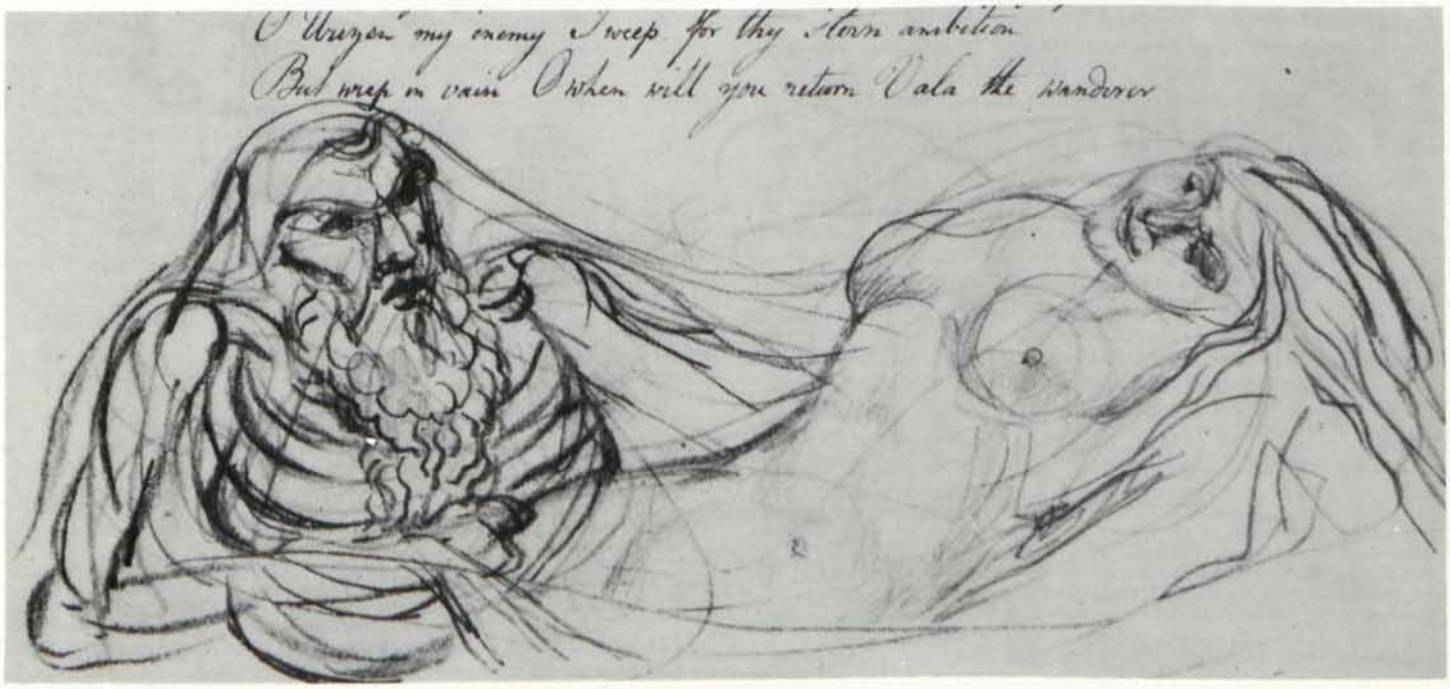
[16] The relevant material is collected in Cohen, *Newton's Papers and Letters*, etc. The letter to Oldenburg which emends the paper, and in so doing recapitulates the idea of condensation, first appeared in Thomas Birch's *The Works of Robert Boyle* in 1744 (I, 74; Cohen, p. 254) and was quickly reprinted in other sources. The complete paper was first published in Birch's *The History of the Royal Society of London* in 1757 (III, 247-305; Cohen, pp. 177-235). But the image was well known before; at the "Academy of Lagado" in *Gulliver's Travels* (1726), "some were condensing Air into a dry tangible Substance, by extracting the Nitre, and letting the aqueous or fluid Particles percolate" (Pt. III, ch. 5). Swedenborg's *Divine Love and Divine Wisdom* was first published in 1763.

Donald Ault seems to have been the first to mention the "Second Paper" in connection with Blake (*Visionary Physics: Blake's Response to Newton* [Chicago & London: Univ. of Chicago Press, 1974], pp. 11, 85) though he does not realize its connection to Swedenborg or to Night the Second. He focuses on the negative "condensations" of *Jerusalem*, suggesting that the void which "shrinks and condenses" entering objects is directed, "very possibly, against Newton's doctrine of solid bodies deriving from condensation of 'aether'" (p. 85).

[17] Isaac Newton, *Opticks: or A Treatise of the Reflections, Refractions, Inflections and Colours of Light*; fore. Albert Einstein; intro. Edmund Whittaker; pref. I. Bernard Cohen; table of contents, Duane H. D. Roller; based on the 4th ed., London, 1730 (New York: Dover, 1952), p. 374. Cf. Ault's peculiar remark: "Blake, by taking things spiritual and mental and causing the Newtonian figures in his myth to condense and contract them into solids, is in this way criticizing Newton's doctrine that there could be no such transformation" (p. 88).

[18] Edwin Authur Burtt, *The Metaphysical Foundations of Modern Physical Science*, 2nd ed. rev., Anchor Books (1932; rpt. Garden City, N. Y.: Doubleday, 1954), p. 282.

[19] Ann. Lavater, E 590; the single instance of "bulbous" eliminates any possibility for the frequently negative associations involved with "roots."

[20] See for example the illustration to Fludd's *Utriusque cosmi . . . historia* reproduced in S. K. Heninger, Jr., *The Cosmographical Glass: Renaissance Diagrams of the Universe* (San Marino, Ca.: Huntington Library, 1977), p. 145.

The Four Zoas, p. 27 (detail). London, British Museum.