CAMBRIDGE

Cambridge University Press
0521622999 - Mary Somerville: Science, Illumination, and the Female Mind
Kathryn A. Neeley
Excerpt
More information

Prologue

Perceiving What Others Do Not Perceive

The "Peculiar Illumination" of the Female Mind

> It is impossible to be a mathematician without being a poet in soul. . . . the poet has only to perceive that which others do not perceive, to look deeper than others look. And the mathematician must be able to do the same thing.
>
> – Sónya Kovalévsky

> Notwithstanding all the dreams of theorists, there is a sex in minds. One of the characteristics of the female intellect is a clearness of perception. . . . when women are philosophers, they are likely to be lucid ones; . . . when they extend the range of their speculative views, there will be a peculiar illumination thrown over the prospect.
>
> – William Whewell,
> Review of *On the Connexion of the Physical Sciences* (1834) by Mary Somerville

Three large windows with extensive views dominate the room in which I wrote most of this book. As I immersed myself in the scientific writings of Mary Somerville and looked at the world outside through

© Cambridge University Press www.cambridge.org

CAMBRIDGE

Cambridge University Press
0521622999 - Mary Somerville: Science, Illumination, and the Female Mind
Kathryn A. Neeley
Excerpt
More information

the lenses her writing provided, those very familiar views took on an entirely new aspect, and the world of nature became much more vast, vivid, and dynamic than I had ever imagined it could be. My own powers of perception had been expanded as I watched Somerville exercise hers. I hope I have succeeded in conveying the power of Somerville's transforming vision. Its power derives in large part from Somerville's ability to use science to heighten perception and stimulate imagination.

The utilitarian goals commonly associated with science often overshadow its other functions. Natural processes tend to operate on a scale that is either too large or too small to be directly observed through our senses; yet, a scientifically informed imagination can transcend the limitations of the human senses, and language can be used to help imagination construct what cannot be directly observed. Similarly, our beliefs about the objectivity of scientific knowledge tend to obscure an important truth about our perceptions of nature. We tend to "see in Nature what we have been taught to look for" and to "feel what we have been prepared to feel." (Nicolson 1959: 5) Much of the cultural significance of science arises from the role it has played in teaching people to see and respond to the natural world.

This capacity to expand the effective perception of reality is shared by literature and science and is always grounded in imagination. When the Russian mathematician Sónya Kovalévsky wrote about the role of imagination in mathematics, she highlighted the ways in which science and mathematics fulfill functions usually ascribed to poetry and other forms of literature. She also called attention to the role of imagination and vision in all of these enterprises. Her analysis reminds us that the essence of any form of expertise is to see what others do not see – to go beyond surface appearances and the limitations of time and the senses to illuminate what would otherwise be hidden and to enlarge our powers of perception in the process. In describing her own experience, Kovalévsky emphasized the synergistic relationship of mathematics and literature in her intellectual life.

> As for myself, all my life I have been unable to decide for which I had the greater inclination, mathematics or literature. As soon as my brain grows wearied of purely abstract speculations it immediately begins to incline to observations on life, to narrative, and *vice versa*, everything in life begins to appear insignificant and uninteresting, and only the eternal, immutable laws of science attract me. It is very possible that I should have accomplished more in either of these lines, if I had devoted myself exclusively to it; nevertheless, I cannot give up either of them completely. (Kovalévsky quoted in Mozans 1913: 165–166)

© Cambridge University Press www.cambridge.org

CAMBRIDGE

Cambridge University Press
0521622999 - Mary Somerville: Science, Illumination, and the Female Mind
Kathryn A. Neeley
Excerpt
More information

Kovalévsky's description articulates what Somerville's scientific writing demonstrates, the rich world of a mathematician who is also "a poet in soul" and moves easily from abstract speculations to observations on life, from having her head among the stars to having her feet firm upon the earth. But Kovalévsky's analysis misses one very important point: both the mathematician and the poet must move beyond private insight to express what they perceive, to make it public and accessible to others. In Somerville's case, the capacities of the poet and the mathematician came together with those of the skillful writer who could not only help her readers see more but also help them see it much more clearly. This ability must have been what William Whewell was talking about when he described "the peculiar illumination" of the female mind. This quality of mind combines the perceptive power of science with that of poetry to go far beyond ordinary experience and to present a view that is at once precisely delineated, easy to comprehend, and pleasurable to contemplate.

Transforming Vision: Connecting Science, Gender, and Illumination

In the sonnet he wrote in response to *Mechanism of the Heavens* and published in his review of *On the Connexion of the Physical Sciences*, Whewell describes Somerville as one to whom "dark . . . seems bright, perplexed seems plain, / Seen in the depths of a pellucid mind." (68) One of the central characteristics of the "pellucid mind" was that it did not sacrifice complexity to achieve clarity, that it could take more into account without clouding the view. The illumination of which he speaks combines breadth of vision and depth of understanding with clarity of perception. It should not be confused with the intuitive perception sometimes associated with women's ways of knowing. It shares the holistic quality of intuition but grows out of the assimilation of numerous technical details rather than somehow circumventing them. For Whewell and his contemporaries, Somerville was not just an expositor or popularizer of science, not another descriptive nature writer who expounded on the limitless beauty of the landscape, but was one of the *illuminati*, one of the enlightened few who grasped the intricacies of science and higher mathematics with a certainty that allowed her to pass the torch of knowledge to others. Whewell described the process in this way:

> One idea after another, of those which constitute the basis of science, becomes distinct, first in the minds of discoverers, then in the minds of

© Cambridge University Press www.cambridge.org

CAMBRIDGE

Cambridge University Press
0521622999 - Mary Somerville: Science, Illumination, and the Female Mind
Kathryn A. Neeley
Excerpt
More information

> all cultured men, till a general clearness of thought illuminates the land; and thus the torch of knowledge is handed forwards, thousands upon thousands lighting their lamps as it passes on; while still from time to time some new Prometheus catches a fresh light from heaven, to spread about among men in a like manner. (1837b: 27)

The image of knowledge being radiated outward from those who first perceive it reflects a dynamic view of the process by which new insights translate into general enlightenment or "clarity of thought," as well as a belief that the illuminating power of new ideas in science is amplified as those ideas become more widely known and understood. This pattern, which might be schematized as idea-illumination-enlightenment, reflects the power ascribed to those who could "catch a fresh light from heaven" and pass it on. The image of the torch of knowledge being passed from one hand to another often appeared on the covers of Somerville's books and functions as a visible symbol of the role that she and her work played.

Whewell further develops the idea of the illuminating female intellect in another poem, this one modeled on Dryden's "Lines on Milton." He replaces Homer, Virgil, and Milton with Hypatia of Alexandria, Maria Agnesi of Italy, and Mary Somerville.

> Three women in three different ages born,
> Greece, Italy and England did adorn;
> Rare as poetic minds of master flights,
> Three only rose to science' loftiest heights. (68)

His replacement of three great male poets by three great women of science is rooted in more than the fortunate accident of parallels in their cultures of origin. He draws on a rich tradition that associates greatness in literature and in science with the sublime vision revealed through a mind that sees more and sees more clearly than others, that comprehends both the vast and the minute, and that synthesizes it all into an awe-inspiring, unified, and coherent view.

People responding to Somerville's work often used language and images drawn from a poetic tradition that originated with Milton and evolved through the praise of Newton. This tradition has been vividly delineated by Marjorie Hope Nicolson in *Newton Demands the Muse* (1946). Nicolson argues that the poets of the eighteenth century saw no exaggeration in Alexander Pope's assertion that

> Nature and Nature's laws lay hid in night;
> God said, "Let Newton be!" and all was light.

The light of the eighteenth-century poets fused Miltonian and Newtonian elements. True science in the mold of Newton combined and

© Cambridge University Press www.cambridge.org

CAMBRIDGE

Cambridge University Press
0521622999 - Mary Somerville: Science, Illumination, and the Female Mind
Kathryn A. Neeley
Excerpt
More information

rehearsed two miracles: "the creation of light in nature" and "the creation of man's reason." (Nicolson 1946: 37) It served as a powerful source of poetic inspiration: "Through their study of Newton, the poets came to look upon nature with new eyes. . . . he had added new beauty because he added new truth." (Nicolson 1946: 19, 32) Poets who studied Newton found that the natural world seemed both richer and larger than it had before. They saw Newton as an illuminator and cosmic voyager: "a mind for ever / Voyaging through strange seas of thought alone." (Wordsworth, *The Prelude*, III: 62–63) The crucial distinction for Somerville's readers was that she cast them in the role of fellow voyager.

Many of her contemporaries described Somerville in terms drawn from this tradition, and Whewell was not the only one who responded with poetry. In his *Lines Suggested by the Third Meeting of the British Association for the Advancement of Science* (1834), William Sotheby questioned why Somerville, who was by then an acknowledged member of the scientific elite, had not attended the meeting, which had been held in June of 1833 at Cambridge. Like Whewell's, Sotheby's lines convey the qualities he perceived in her person and her writing. He addresses her as "High gifted Somerville"; as "thou, in whom we love alike to trace / The force of reason, and each female grace"; and as a "cultured mind, / Smoothing the path of knowledge to mankind." Sotheby's poem also reflects the recognition Somerville had achieved, the esteem in which she was held: "While Cambridge glorying in her Newton's fame, / Records with his, thy woman's honoured name."

Twenty years later, the Italian countess Caterina Bon-Brenzoni also used poetry to convey her response to Somerville. Bon-Brenzoni's poem "I Cieli," or "The Heavens" (1853), illustrates the kind of response Somerville provoked, the kind of figure she was perceived to be, and the extent to which she mastered what Nicolson has labeled the "aesthetics of the infinite," an imagination-expanding response to the vastness and majesty of the universe. (Nicolson 1959: 140)

The poet responds to Somerville with trembling, reverence, and wonder, "overcome by love." Yet Somerville speaks to her "soft and low with the angelic voice and the humility that wisdom teaches to those who are dearest to her." Bon-Brenzoni addresses Somerville as "Kindly guide," one who has led her from sun to sun and through constellations: "God's own Pavilions! Temples of light!" Through Somerville, the poet has perceived the immensity of creation, concluding, "The pangs are on the same scale as that space and those worlds, emotion and thought are without limit." The encounter is clearly a mind-expanding experience as well as an uplifting and humbling one, and Somerville emerges from Bon-Brenzoni's poem a

© Cambridge University Press www.cambridge.org

CAMBRIDGE

Cambridge University Press
0521622999 - Mary Somerville: Science, Illumination, and the Female Mind
Kathryn A. Neeley
Excerpt
More information

kind of Virgil figure, or perhaps more appropriately, a combination of Virgil, Beatrice, Milton, and Newton. In yet another blending of scientific and literary traditions, Bon-Brenzoni portrays Somerville as both the cosmic voyager of Newtonian science and the gentle guide of epic poetry.

Though it illustrates well the poetic inspiration Somerville's writing could provide, there is one respect in which Bon-Brenzoni's response and the other poetic responses are misleading. They are much more effusive than Somerville's writing, even at its most intense and poetic. The novelist Maria Edgeworth, in a letter to Somerville on May 31, 1832, reflected on this restrained poetic quality.

> The great simplicity of your manner of writing, I may say of your *mind*, which appears in your writing, particularly suits the scientific sublime – which would be destroyed by what is commonly called fine writing. You trust sufficiently to the natural interest of your subject, to the importance of the facts, the beauty of the whole, and the adaptation of the means to the end, in every part of the immense whole. This reliance upon your reader's feeling with you, was to me very gratifying. (PR 204)

The simplicity of mind and presentation to which Edgeworth alludes are associated with another aspect of the aesthetic tradition in which Somerville worked and with which Whewell and others associated her – the ideal of the supreme intelligence or divine mind, which "conserves the principle of order in the midst of perplexity." (Herschel 1832: 541)

A Dialogue Between Poetry and Science

There is a sense in which Somerville's writing can be understood as a dialogue between poetry and science. There are relatively few direct quotations from poetry in Somerville's scientific writing; the poetic element derives from the themes she uses and the scenes she sets. Still, her writing can be read as an implicit dialogue between scientific knowledge and the perspectives offered by poetry. This dialogue is carried on so subtly that it is often difficult to discern in her writing; what is going on is clearer in the notebooks she used to collect material for her books.[1]

[1] These notebooks are not very consistently or systematically organized, and it is sometimes unclear which of her publications they relate to. They are filled with extracts from scientific papers she has read, paraphrased accounts of new developments, factual statements, summaries, and observations as well as aphorisms, anecdotes, and poetry that provides perspectives on science. (Somerville Collection: Folder MSSW-5 Dep. c. 352)

© Cambridge University Press www.cambridge.org

CAMBRIDGE

Cambridge University Press
0521622999 - Mary Somerville: Science, Illumination, and the Female Mind
Kathryn A. Neeley
Excerpt
More information

Sometimes the material in the notebook is attributed to an author and publication; frequently, it is unidentified. The topics range from "Faraday on the Electric Telegraph" and "Researches on Light by Mr. A. J. Angström" to "Specific Heat" and "E. J. Cooper on the Perihelion and Nodes of the Planets." Sometimes the material takes the form of unattributed quotes, such as the following: "We must never forget that it is principles, and not phenomena; – laws not insulated and independent facts which are the objects of inquiry to the natural philosopher." And, "The ultimate object of all Science is to improve the character and condition of the human race." The notebooks constitute a kind of varied, wide-ranging, and very loosely organized conversation about science. This collection of material is synthesized, reworked, reorganized, and reused in a complex way. A part of a paraphrased passage will appear in one book, another part of the same passage in another book.

Some of the most interesting transformations have to do with poetry, which is directly quoted more often in the notebooks than in the books Somerville published. In one of the notebooks, the left-hand page contains a summary of a statement from William Herschel, indicating the number of stars that passed across the view through his telescope in an hour. Below this passage is a quotation from Byron concerning human insignificance in the grand scheme of nature. On the opposite page, there are extensive quotations from Byron's *Cain* (1905), which refer to the "beautiful, unnumbered, and endearing" suns "Not dazzling, and yet drawing us to them." Although the poetry itself does not, the images and sentiment conveyed by the poetry find their way into Somerville's text. Science, poetry, and philosophy are interwoven into a coherent and inspiring account. In note form, the account seems chaotic, even schizophrenic; in finished form, it is enormously rich.

An example of this kind of dialogue or interweaving occurs in *On the Connexion of the Physical Sciences*, where this summary of William Herschel's observations appears:

> Great as the number of comets appears to be, it is absolutely nothing when compared with the multitude of the fixed stars. About 2000 only are visible to the naked eye; but when we view the heavens with a telescope, their number seems to be limited only by the imperfection of the instrument. In one hour Sir William Herschel estimated that 50,000 stars passed through the field of his telescope, in a zone of the heavens 2° in breadth. This, however, was stated as an instance of extraordinary crowding; but, on an average, the whole expanse of the heavens must exhibit about a hundred millions of fixed stars within the reach of telescopic vision. (Conn 361)

One might be tempted to think that the poetry had been abandoned, since twenty pages of detailed scientific summary follow this passage,

© Cambridge University Press www.cambridge.org

CAMBRIDGE

Cambridge University Press
0521622999 - Mary Somerville: Science, Illumination, and the Female Mind
Kathryn A. Neeley
Excerpt
More information

as Somerville surveys the cataloguing of stars; binary, multiple, and nebular systems; the laws of motion as they apply to the movements of the stars; and the distances of the stars from earth and their distribution in the heavens. Before she moves into a discussion of meteorites and shooting stars, she pauses for an internal summary that transforms Byron's poetic sentiments and perspective, blends them with Herschel's observations, and presents an expertise-based portrait of the stars as seen not from the earth but from the heavens:

> So numerous are the objects which meet our view in the heavens, that we cannot imagine a part of space where some light would not strike the eye; – innumerable stars, thousands of double and multiple systems, clusters in one blaze with their tens of thousands of stars, and the nebulæ amazing us by the strangeness of their forms and the incomprehensibility of their nature, till at last, from the limit of our senses, even these thin and airy phantoms vanish in the distance. (Conn 381)

She then uses this view from the heavens, what I will call here the cosmic platform, to engage the reader's imagination and to provide an even more expansive view that includes not only the heavenly bodies we can see, but also those we cannot.

> If such remote bodies shone by reflected light, we should be unconscious of their existence. Each star must then be a sun, and may be presumed to have its system of planets, satellites, and comets, like our own; and, for aught we know, myriads of bodies may be wandering in space unseen by us, of whose nature we can form no idea, and still less of the part they perform in the economy of the universe. (Conn 381)

This passage, like many others in Somerville's works, reveals not only her powerful intellect, but her imaginative and illuminated soul.

The Scientific Sublime as the Fusing of Traditions

Somerville's writing, then, evokes the scientific sublime, the capacity of the vision of nature revealed through science to summon forth the same sense of majesty and power that human beings feel in the presence of God.[2] Somerville combines vision on a cosmic scale with a restrained poetic quality, even as she presents the substance of abstruse and recondite science. The scientific sublime also raises the reader

[2] In *Mountain Gloom and Mountain Glory* (1959), Nicolson defines the essence of the sublime as follows: "The manifestations of God's majesty and power in Nature must evoke in sensitive minds some degree of the awe they feel for God Himself, which is the essence of the Sublime experience." (282)

© Cambridge University Press www.cambridge.org

CAMBRIDGE

Cambridge University Press
0521622999 - Mary Somerville: Science, Illumination, and the Female Mind
Kathryn A. Neeley
Excerpt
More information

into a realm beyond ordinary human experience, as demonstrated in a discussion of the propagation of sound. Following an extended analogy comparing light, heat, and sound, Somerville moves the reader smoothly and rapidly from earthly phenomena to an empyrean view, a cosmic platform:

> above the surface of the earth, [where] the noise of the tempest ceases and the thunder is heard no more in those boundless regions, where the heavenly bodies accomplish their periods in eternal and sublime silence. (Mech lviii)

This platform strikingly resembles the regions of calmness and serenity above "this dim spot / which men call earth" to which Whewell refers in his review. (1834: 65)

Like the poets on whom she drew, Somerville was profoundly affected by the view of nature revealed through the telescope, the microscope, and other tools of science. She was also extremely skillful in recreating the experience of the scientific sublime for her readers. But, unlike the scientific poets of the eighteenth century or the prolific nature writers of the nineteenth century, Somerville was able to convey the detailed substance of science in an authoritative manner even as she provided the reader with a great deal of pleasure. Close examination of her works shows that only a small portion of each was devoted to creating the framework and developing the themes that evoked the scientific sublime. In the bulk of her work, she offered technically precise and highly detailed accounts of the substance of science and mathematics. She presented science as both "exact calculation" and "elevated meditation." She took the poetic traditions established by Milton, the eighteenth-century poets, and the early nineteenth-century Romantic poets and transformed them for scientific prose. In the process, she created a powerful and persuasive rhetoric for science, which relied on new ways of seeing and responding to the natural world. She also established herself as one of most eminent scientists of her day.

Somerville rose to eminence by teaching people to use science and a variety of existing aesthetic traditions to see and respond to the natural world in a new way. In an era of rapid scientific and social change, she was able – through her person and her writings – to represent science as a progressive and enlightened enterprise that was compatible with, indeed supportive of, moral, religious, and aesthetic traditions. She marshaled the resources of the poets and the leading lights of science in the effort, and she showed how the illumination of science could be transformed into enlightenment for humankind; human imagination empowered through science could

© Cambridge University Press www.cambridge.org

CAMBRIDGE

Cambridge University Press
0521622999 - Mary Somerville: Science, Illumination, and the Female Mind
Kathryn A. Neeley
Excerpt
More information

cross magnitudes of space and time; language could be used to help imagination construct what could not be directly observed.

Countless examples demonstrate that "early Victorian scientists . . . had a love for what lay outside the experience of the ordinary man" (Schweber 1981: 18), and much of the appeal of science in the Victorian era lay in its capacity to enable human beings to get beyond what they could know through ordinary experience. The power of science was perhaps best symbolized in the predictive power of physical astronomy and geology, where accurate and powerful inferences about past and future could be made based on very little directly observed data. Although Somerville recognized that both language and imagination sometimes fail in their attempt to describe the natural world, her own writing shows the extent to which language can be used to push the frontiers of imagination. Her work and her reader's responses to that work reveal the ways in which science, like poetry, can be conceived as a heightened form of perception and expression. Writing in an era before electronic media, when views on a cosmic scale could be constructed only in words and reconstructed only in imagination, Somerville presented a vision of the universe whose magnitude and immensity gave readers pleasure, expanded their minds, and enlarged their conception of the universe. She employed both science and literary imagination in the effort and blurred the boundaries of gender and genre in the process.

© Cambridge University Press www.cambridge.org