The Romantic Vision of the Unity of Science and Poetry and the Institutionalization of Science in England

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The Romantic Age

The period of English Romanticism, from the last decade of the 18th century to the 1820s, was a time when the scientific education and researches began to be systematized. The foundation of the British Association for Advancement of Science (BAAS) in 1831, was actually a claim against the old regime of the Royal Society whose members consisted largely of amateur gentlemen of science. The BAAS declared that they would choose members according to their merits, while organizing annual conferences throughout the United Kingdom. William Vernon Harcourt, founder of the BAAS, claimed that the aim of the organization was "to give a stronger impulse and more systematic direction to scientific inquiry (Morrell, 70)",[1] and to develop human networks through scientific knowledge.

The blooming Industrial Revolution, with the growth of population in England, boosted the demand for scientific researches in order to advance various industries; for example, chemistry would support the improvement of technology and agriculture, and botany would enhance food supply. The Romantic poets experienced this transformation, if not consciously, and were imbued with the growing number of scientific literature, some of which however they cherished as sources for poetic metaphors. They were also interested in scientific practice as a means of amelioration of the society; science had the power to change the society, like the voice of a poet who was addressing directly the visions for a better world to the people.

The theme of the relationship between science and literature may remind us of C. P Snow's 'two cultures'.[2] This is a historical concept that dates back to the 19th century, so that it may be applicable to consider the way in which the

[1] In a letter of Harcourt to Lord Milton, 21st September 1830.

[2] C. P. Snow presented his idea of "the two cultures" in his Rede lectures in 1959, saying that there was in the western society a spilt in the intellectual people, dividing them into the sciences and the humanities. See Snow, especially 1-21.

Romantics thought of science. However, the concept of the 'two cultures' is clear yet oversimplified, especially when it comes to the Romantics, since the gradual, though sporadic, systematization of scientific studies throughout the 19th century had not affected straightforwardly to formulate the 'two cultures'. Of course, Snow conceived of the academic phenomena of the 'two cultures' as a result of the systematization of scientific studies in England, which led the literary studies to claim to their own specificity and disciplinary coherence, in the early 20th century. However, things were different in the early 19th century; the relationship between science and poetry for the English Romantics was not hostile but mutual, and they could interact with each other if not associate. From this point of view, the name of scientific poetry cannot only be applied to poems overtly including scientific themes or interests. It must encompass those literary ideas that express a mutual relation between science and poetry. In this paper, I shall argue that the English Romantic poets pursued the vision of the unity of science and poetry. While doing so, I would also like to explore how the institutionalization of science in England affected the development of that vision.

The 1790s

In the 1790s, science was not yet clearly divided into specific disciplines. Joseph Priestley, a renowned man of science often cited as the discoverer of oxygen, was also a vehement theoretical orator who supported causes of the French Revolution. It is well known that the Romantic poets, Samuel Taylor Coleridge and Robert Southey, planned to immigrate to North America, naming its scheme as Pantisocracy, where all human rights were equal, and private property was prohibited. This immigration plan was made partly because of Joseph Priestley's own immigration to America with his family, which would be followed by other people who idolized him and expected him to be the head of the new settled community. Coleridge and Southey did not join him, and they gave up their immigration plan, and the scheme of Pantisocracy was soon dissolved for some reason. However, it is clear that they, especially Coleridge, had a profound sympathy with Priestley, a religious man of science. In his opinion, the fundamental purpose of Priestley's famous experiments on air was the revelation of the principle of life in air, "*breath*," or combustion or "*fire*," and it resulted in "giving *wings* to [Priestley's] more sublime theological works" (*CL*, 1:372). When Priestley's house was attacked by the mob in 1791, Coleridge wrote a sonnet dedicated to Priestley in the Miltonic tradition of political sonnets. It appeared in the *Morning Chronicle* in 1794: "Tho' rous'd by that dark Visir RIOT rude/ Have driven our PRIESTLY o'er the ocean swell..."

("Sonnet: To Priestley," ll. 1-2; *PW*, 1: 158). He concluded the poem, describing Priestley as a scientific saint, as follows: "… from her dark retreat by Wisdom won/ Meek NATURE slowly lifts her matron veil/ To smile with fondness on her gazing son!" (ll. 12-14).

Priestley considered that science and religion were ultimately one, and connected his scientific view of air with the power of God. He claimed that the notion of the "immaterial" in the modern sense could be reworded in terms of the material in ancient thought, in order to support his own theory of materialism. He observed that "what the ancients meant by an immaterial being, was only a *finer kind* of what we should now call *matter*; something like *air* or *breath*, which first supplies a name for the *soul*, or else like *fire* or *flame*, which was probably suggested by the *warmth* of the living body" (Priestley, 3: 369). Coleridge could not accept Priestley's materialism, although he paid full respect to Priestley's scientific achievement. For Coleridge, science was a stimulating field through which he could investigate the communication between the spiritual and the material, and it provided a strong means of improving social conditions, supporting the belief in the progress of humanity.

Dr. Thomas Beddoes, an energetic medical practitioner and vehement advocate of the cause of the French Revolution, was one of the scientific followers of Priestley, and he made his medical practice on the ground of Priestley's research on air. Coleridge proclaimed the social merit of Dr. Beddoes's medical practice in his own journal, *The Watchman* published in 1796. Reviewing Beddoes's article, entitled "A letter to the Right Hon. WILLIAM PITT, on the Means of relieving the present Scarcity and preventing the Diseases that arise from meager Food", Coleridge writes:

> To announce a work from the pen of Dr. Beddoes is to inform the benevolent in every city and parish, that they are appointed agents to some new and practicable scheme for increasing the comforts or alleviating the miseries of their fellow-creatures. (*Watchman*, 100)

Introducing Beddoes in his argument presents the reader of *The Watchman* with a question about the true patriorism. According to Coleridge, a true patriot would dedicate himself to serving society, for example, by introducing a practical means of reducing misery; the true patriot was a person like Beddoes who had presented a plan to improve the diet of the people in England. Coleridge's review was full of sympathy with Beddoes's criticism of the wealthy people who were unable to imagine the condition of the poor.

In those years, Beddoes had been trying to set up his own medical institution. Accepting Priestley's idea that regarded "nitrous air" as supporting the mechanism of respiration, Beddoes claimed that "Factitious Airs might be

advantageously introduced into the Practice of Medicine" (Beddoes, 3). He had made public his plan of establishing a medical institution, considering that "a small appropriated Institution would conduce more to this purpose in two, than occasional and dispersed practice in twenty years" (Beddoes, 5). Beddoes was known for his radical politics, and his innovations were therefore likely to be understood in terms of radicalism, whether favourably, or unfavourably. Beddoes's plan for an institution was at first considered difficult to realize, as one of his friends even observed that "it is the order of the day to suppress or oppose all *Jacobin innovation*..." [3] In 1798, Beddoes at last succeeded in founding an institution, named the Pneumatic Institution, in Clifton, Bristol, financially supported by subscribers mainly from the Midlands and Birmingham. The members of the Lunar Society of Birmingham were most helpful in assisting his setting up of the Institution; Richard Lovell Edgeworth, who had become Beddoes' father-in-law in 1794, subscribed, and Erasmus Darwin started gathering subscriptions among the social elite of Derby, relating to physicians and manufacturers; and James Watt, who had produced a breathing apparatus for the medical use of gases, also encouraged the members of his family to subscribe, together with the Wedgwood family.[4] In the growing industrial cities, there were people who were willing to support the development of practical sciences, education, and welfare, and one of the effects of the cultural awareness that they had produced was the financial support that was officially offered in 1798 to Coleridge by the Wedgwood family, i.e. Josiah Wedgwood and Thomas Wedgwood.

Coleridge's Bristol circle, including Robert Southey, Dr. Beddoes, and Humphry Davy, was involved with plenty of experimental ventures. Davy, who later became the president of the Royal Society, began his career as a man of science at Bristol, while Coleridge and Southey, who of late had abandoned their Pantisocratic scheme, starting their literary career. Coleridge also met William Wordsworth for the first time at Bristol – an encounter that led them to publish the *Lyrical Ballads*, which has been often considered as the advent of the English Romantic movement. At the Pneumatic Institution, Beddoes, with the young Humphry Davy as his assistant, began experimenting with the inhalation of nitrous oxide, or "laughing gas", which was believed to alleviate pain and cure hopeless diseases. Davy recorded the effects of the gas, observing sampled people including Coleridge. Coleridge said that, after inhaling four times, he felt that "[his] sensations were highly pleasurable, not so intense or apparently local, but of more unmingled pleasure than [he] had

[3] Quoted in Levere, *Chemist and Chemistry,* part 7, 41-49. Those who had been sympathetic with the cause of the French Revolution were increasingly likely to be vindictively labeled as "Jacobin," even if, as in the case of Coleridge, they were not advocates of Jacobinism. See *BL,* 1: 184.

[4] More details are given in Golinski, 162-65.

ever before experienced" (Davy, 3: 307). The inhalation of nitrous oxide, though its medical effect was not clearly known, created a kind of sensation, or a set of gossips, among people. It seems that the people experiencing the inhalation felt that they were short of appropriate terms for expressing their own feelings; one of them said, "our vocabulary is very defective," so that "we must either invent new terms to express these new and particular sensations, or attach new ideas to old ones, before we can communicate intelligibly with each other. . ." (Davy, 3: 305-6). The gas, newly brought to the people for the purpose of freeing them from pains, also emancipated their feelings from ordinary ones, leaving them in demand for new terms to express their unusual experience.

Here we can see some analogies between the experiment of the inhalation of nitrous oxide and the underlying purpose of the first edition of the *Lyrical Ballads*, first published anonymously in Bristol in 1798. The Advertisement to the 1798 edition of *Lyrical Ballads* suggests that the volume of poems is a poetic transformation of what had been implicitly ascribed to the experimental medical cure conducted at the Pneumatic Institution. It says: "The majority of the following poems are to be considered as experiments. They were written chiefly with a view to ascertain how far the language of conversation in the middle and lower classes of society is adapted to the purposes of poetic pleasure" (Wordsworth and Coleridge, *Lyrical Ballads*, edited by Brett and Jones, 7). The author uses the term "experiment" in order to describe the content of the volume, and legitimates the poet's adaptation of "the language of conversation in the middle and lower classes of society" by describing it as part of a reformation of poetic expressions, and a search for new terms to express new experiences. Readers of the *Lyrical Ballads* who sympathize with its naturally described human passions and characters are to feel pleasure, and to be liberated from the suffering caused by their prior detachment from true human passions, even when reading what had traditionally been called 'poetry.'

The Royal Institution

By the time when the second edition of the *Lyrical Ballads* was published in 1801, Humphry Davy had been invited to be a lecturer of the newly founded Royal Institution of London. The coming of the new age of poetry represented by the publication of the *Lyrical Ballads* thus took place simultaneously with the emergence of new, institutionalized scientific researches. The prehistory of the Royal Institution suggests that the professionalism of science was related to social welfare, and that the distribution of scientific knowledge was supported

by educational needs. Sir Benjamin Thompson, Count Rumford, who was himself a man of science, introduced a set of proposals for setting up an institution in 1796, appealing to the members of the Board of Agriculture and the Society for Bettering the Condition of the Poor, speaking about "feeding the Poor, and giving them useful Employment," "furnishing Food at a cheap Rate," and "bringing forward into general Use, new Inventions and Improvements... and... to various other mechanical Contrivances by which *Domestic Comfort* and *Economy* may be promoted" (quoted in Berman, 14n). These proposals subsequently gathered proprietors, centering on Sir Joseph Banks who was at the period the president of the Royal Society, and Rumford recommended the lectures on the following subjects at the institution: "heat, fuel, combustion, clothing, ventilation, refrigeration, vegetation, manures, digestion, tanning, soap-making, bleaching, and dyeing" (quoted in Berman, 15).

Given this context, Davy's lectures in 1802 at the Royal Institution included many related topics and experiments. Coleridge looked for Davy's lectures in 1802, and he subsequently attended several of them. It was the first time that Coleridge observed Davy in the lecture theatre of the Royal Institution. The building had recently been completed in February of 1801, and it was the first theatre intended for scientific lectures in England.[5] The grandeur of the newly constructed building might have moved Coleridge, while listening to one of Davy's lectures in which he experimented with various gases, to say that "If all aristocrats [were] here, how easily Davy might poison them all" (*CN*, 1: 1098 f31). Coleridge's radicalism, however, was rather irrelevant when thinking about the situation in which Davy had conducted his researches and delivered lectures. Scientific education was one of the purposes of the Institution, and others included investigations of practical applications of scientific knowledge which were useful for the improvement of domestic products and appliances. Davy's scientific research had followed the interests of the proprietors, most of whom were landowners, and, as I have pointed out, it was an age when pressing concerns for agricultural productivity, and philanthropic interests in rural poverty were well recognized. These demands soon became more pressing due to the political situation of the Continental Blockade.

When he attended Davy's lectures in 1802, Coleridge was a leading writer of the *Morning Post*. He noted that he saw "Strength of Feeling connected with vividness of Idea—Davy at the Lectures" (*CN*, 1: 1099). Reading Coleridge's notes on Davy's lectures is quite suggestive of the intellectual climate of the age when a poet and a writer of contemporary journalism could be fascinated

[5] Regarding the construction of the lecture theatre, see Berman, 25-26.

by experiments on oxygen, oxide substances, hydrogen, nitrogen, sulfur, carbon, and various other elements or compounds. Chemical knowledge at this time provided Coleridge with metaphors, such as "Diamond pure chrystallized [sic] Carbon" (*CN*, 1: 1098 f11v), and "Diamond + x Oxygen = Charcoal N. B. [Joseph] Cottle's Psalms—" (*CN*, 1: 1098 f 28v)[6], though these references seem rather insignificant among his notes. It is clear that Coleridge took notes to follow the factual information Davy gave to the audience. Introducing the characteristic nature of oxygen gas, Davy made sparkles of light one after the other, and Coleridge recorded, for example, "how much more brightly it [oxygen gas] burns—/ and if we extinguish the flame in the atmosphere, & leave only the ignited wick, it will be relumed in the Oxygen Gas" (*CN*, 1: 1098, f3); or "Ether . . . burns bright indeed in the atmosphere, but o! how brightly whitely vividly beautiful in Oxygen gas" (*CN*, 1: 1098, f5). Davy manipulated the oxygen to produce the white and beautiful light; he had developed his study on the air, the oxygen gas, focusing on the various phenomena in combustion.

Considering the numerous references to practical applications of chemical knowledge in his notes, however, what Coleridge witnessed most, though not entirely consciously, was probably the underlying demand for the social usefulness of scientific researches. For example, Davy's experiments on hydrogen introduce the idea of the hydrogen pistol. If the air contains a high density of hydrogen, Coleridge notes that "it detonates... with a vengeance" (*CN*, 1: 1098 f8v). It follows that people came to think it possible to apply hydrogen gas as a form of gunpowder for a cannon: "Hold the Cannon over the Bottle containing Hydrogen Gas – applied a Leyden phial to it – bang" (*CN*, 1: 1098 f8v). The feasibility of this weapon might have been questioned, but this observation points to the fact that it was still the age of gunpowder, which was made of an explosive mixture of sulfur, charcoal, potash and other substances; these ingredients were among the substances that Davy knew well how to procure, as he explained their properties through the experiments in the lectures. It was also an age when the British army sought for effective weapons to win battles, and it would surely have been helpful to them if their gunpowder could have been provided from the common air for free. Davy also showed that hydrogen is lighter than the common air; "Hence," Coleridge writes, "Hydrogen Gas employed for Balloons" (*CN*, 1: 1098 f9). The method of making soap was given in his explanation of soda, or sodium carbonate, which, Coleridge notes, is "obtained from the ashes of Sea-weed," made "pure by treatment with Lime & Alcohol," and "combined with oil form[s] soaps" (*CN*, 1: 1098 f 17v-18v). Davy's reference to "muriatic Bleaching" and his suggestion of

[6] Joseph Cottle was a friend of Coleridge and the publisher of the first edition of the *Lyrical Ballads* in 1798; he also wrote poems.

its practical use seems to attract Coleridge who had been a bookworm: "Common writing ink easily destroyed by oxygenated muriatic gas," whereas "Printing Ink not at all altered by the gas – it is therefore employable in whitening Prints & old Book[s]" (*CN*, 1: 1098 f 30).[7]

Davy is known for his identification of aluminum in 1808, yet he had already observed the characteristic nature of aluminum compounds, which were at that time related to the pottery industry. Coleridge writes:

> Alumine, or earth of clay – procured from sulphate of Alumine, i.e. Alum – / Solution of Alum – pour into Caustic potash/ a white precipitate is immediately formed – this is pure alumina – insoluble in water, but easily diffused thro' it – combinable with all the acids – contracts in volume in proportion to its heat – hence Wedgewood's pyrometer, Alumine forms the basis of Porcelain & pottery – combined with flint, magnesia, & other earths. (*CN*, 1: 1098, f15v-f16)

"Aluminne", or aluminum oxide, is a key element of ceramics, as it gives strength to ceramic products according to the degree of its temperature; and we can see that this substance was obtained by a chemical reaction between a solution of alum earth and potassium hydroxide. Josiah Wedgwood's pottery industry and his well known invention of the pyrometer were thus explained in chemical terms. Potash, whose base Davy later termed potassium, was also considered in terms of soil science; it is "exceedingly caustic," and "turns (besides blue into green) brazil wood from red to purple—likewise turmeric from yellow to Brown" (*CN*, 1: 1098 f17v). These observations might have contributed to Davy's developing study of agricultural chemistry – the field in which the public most awaited discoveries due to the social demand for agricultural productivity. Davy well answered to this demand by writing *Elements of Agricultural Chemistry,* published in 1813.

After attending Davy's lectures in 1802, Coleridge began to feel that the meaning of the scientific research at the Royal Institution was somewhat different from what he had expected since the time when he advocated Dr. Beddoes scientific practices. It was partly because of the change of the political situation of Great Britain, and probably partly because of the social pressure on Davy. Coleridge sometimes met Davy in London, and wrote in 1804 as follows:

> I... called on Davy who seems more and more determined to mould himself upon the Age in order to make the Age mould itself upon him – into this Language at least I have translated his conversation / oh it is a dangerous business this Bowing of the Head in the Temple of [M]ammon… (*CL*, 2: 1042)

[7] "[M]uriatic Bleaching" is an effect of chlorine, the name of which Davy coined in 1810. Chlorine gas was poisonous and used as a weapon in the First World War.

The 'temple of mammon' alludes to the upper class society, most of which members were landowners. What Coleridge wrote in this letter about Davy's remarks was an upper class demand for scientific achievements, which would improve their land products, and consequently strengthen the power of the nation. In this context, science seemed to be the power effective more for serving the landowners' interests than for saving the poor.

Davy was famous for his eloquence at lectures, often colored with poetic expressions. He made important experiments and discoveries there, and was knighted in 1812, and became the president of the Royal Society in 1820. His success story however seems now not so much sensational than it actually was; it is rather obscured by the accomplishment of Michel Faraday who succeeded Davy and established the modern research field of electro-magnetics. However, it should be remembered that Davy was the first man of science whose steps on scientific research directly led towards the age of professionalism.

The Poet's Vision

Davy's active presence as a man of science influenced Coleridge and Wordsworth, both of whom developed their own visions of the interrelation between poetry and science. Davy, at his first lecture at the Royal Institution in 1801, proclaimed: "Science has done much for man, but it is capable of doing still more... and in considering the progressiveness of our nature, we may reasonably look forward to a state of greater cultivation and happiness than that we at present enjoy" (Davy, 2: 319). The strong belief in progress is resonant with what Wordsworth wrote in the preface to the 3rd edition of the *Lyrical Ballads* in 1802:

> If the labours of men of Science should ever create any material revolution, direct or indirect, in our condition, and in the impressions which we habitually receive, the Poet will sleep then no more than at present, but he will be ready to follow the steps of the Man of Science, not only in those general indirect effects, but he will be at his side, carrying sensation into the midst of the objects of the Science itself. (*Lyrical Ballads,* edited by Brett and Jones, 259-60)

Wordsworth was informed of Davy's lectures from Coleridge, and this reference to the collaboration between "the Poet" and "the Man of Science" might be considered as an expression of what Wordsworth and Coleridge saw in between their poetic achievement and Davy's. As we saw, Davy was one of Coleridge's Bristol friends, and Coleridge was a collaborator of Wordsworth.

These three were, at least in the poet's vision, interrelated in terms of something in common with science and poetry.

Coleridge's fundamental concern for science was to prove the unity of the material world and the mind, not in the manner of Priestley's materialism, but in search of a unifying power over nature. For Coleridge, there had been various ways of seeking for a unifying power or element encompassing the material universe and the spiritual world. The phenomena of ether and electricity, for example, gave birth to analogical thoughts about the possibility of postulating a unifying law below the surface of the material world. Coleridge's diagram[8], or "the dynamic Compass" (*CM*, 5: 263), was a result of these pursuit; it consists of the ideal elements representing a set of principles, namely carbon, azote or nitrogen, oxygen and hydrogen, pointing to north, south, east and west respectively. According to Coleridge, "each of the four principles involves the other three, but as under the predominance of one" (*CL*, 4: 808). Therefore, though it may sound uncanny when considering our modern conception of matter, carbon is not carbon itself, but a material that involves the remaining three under the predominance of carbon. In like manner, Coleridge writes that he doubts not " [that many Substances are either] not yet discovered, or tho' known yet confounded under the common name of Hydrogen, forming a continuous chain of Stuffs from Azote to Hydrogen... and from Hydrogen to Carbon – not by factitious combination but by primary co-inherence" (*CL*, 4: 773). Coleridge believed that when all substances are connected with each other by the "primary co-inherence," the material world is, fundamentally speaking, "indecomponible" (*CL*, 4: 773). [9] Thus the corpuscular philosophy of nature is totally refuted, and the decomposition of substances, which Davy had conducted in his experiments in many ways, is no longer however regarded as the prime concern of chemical philosophy.

It is interesting to note that Coleridge's view of all that is inherent in nature had already been in some ways speculated on by Davy himself, in his consideration of the validity of the old theory of phlogiston. In his Bakerian lecture in 1807, Davy stated that:

> A phlogistic chemical theory might certainly be defended, on the idea that the metals are compounds of certain unknown bases with the same matter as that existing in hydrogen; and the metallic oxides, alkalies and acids compounds of the same bases with water... In my first experiments on the distillation of the basis of potash finding hydrogen generally produced, I was led to compare the phlogistic hypothesis with the new facts, and I found it fully adequate to the explanation. (Davy, 5: 89-90)

[8] Coleridge wrote about this diagram in many ways, see, for example, *CL*, 4: 772.

[9] Later, Coleridge had developed the concept of "the primary co-inherence" of nature. John Beer gives a compact set of references in which Coleridge considered the continuity of nature in "Note 11. Coleridge on the Law of Continuity" ("*In nature there are no leaps*"), in *Aids to Reflection*, 559-60.

The phlogiston theory postulates the phlogiston, a substance which is emitted in combustion. Davy's observation is based on the fact that when burning metals, hydrogen is produced, or water is produced in the case of potash; therefore it is possible to suppose that "certain unknown bases" exist in hydrogen or in water, which can be substitutes for phlogiston. In the phenomena of combustion, by supposing a new hypothetical substance, Davy was aiming at revealing a constituent element that guarantees a uniformity and simplicity in nature. Although Davy did not prove any unified theory of the material world, he did not lose his interest in the philosophical aspects of chemistry, concerning the fundamental laws that govern the material universe, as is shown in his speech when presenting the award to Dalton.[10]

In later years, Coleridge pursued the unity of the human mind in his "Essays on the Principles of Method," published in 1818. According to him, the science of method will actualize the process of making relations between what the mind perceives and what it produces, rendering it something like a living organism which has the "principles of *unity* with *progression*" (*Shorter Works*, 1: 668). Coleridge's method is appropriate to his faith in the co-inherence of nature; he proclaims that "should its [science's] objective truth be hereafter demonstrated by induction of facts in an unbroken series of correspondences in nature, we shall then receive it as a *law* of organic existence" (*Shorter Works*, 1: 647). This law is a unifying principle of nature which both Davy and Coleridge had explored in different ways. Coleridge declares:

> Such, too, is the case with the substances of the LABORATORY, which are assumed to be incapable of decomposition. They are mere exponents of some one law, which the chemical philosopher, whatever may be his theory, is incessantly labouring to discover. The law, indeed, has not yet assumed the form of an idea in his mind; it is what we have called an Instinct; it is a pursuit after unity of principle, through a diversity of forms. Thus as "the lunatic, the lover, and the poet," suggest each other to Shakespeare's Theseus, as soon as his thoughts present him the ONE FORM, of which they are but varieties; so water and flame, the diamond, the charcoal, and the mantling champagne, with its ebullient sparkles, are convoked and fraternized by the theory of the chemist. (*Shorter Works*, 1: 647-48)

The substances that had been considered "incapable of decomposition" were decomposed by Davy in his Galvanic experiments, yet this is not the final purpose of the scientific investigation; a scientific philosopher should further investigate "some one law" to guarantee the harmonious relations of the whole, and this investigation should not be impeded by materialistic

[10] In his address when presenting the award of the Royal Medal to John Dalton in 1826. See, Davy, 7: 97-98.

preconceptions. As Coleridge described it in Shakespeare in terms of the characters of Theseus, a unity in varieties of forms may be one of the principles which connect a poetic vision to the conception of a chemist. Here the science of method embraces the poetic and the scientific. Coleridge goes on to discuss the unity of poetry and science, quoting *Paradise Lost*, saying, "If in the greatest poets we find nature idealized through the creative power of a profound yet observant meditation, so through the meditative observation of a Davy, [and others,][a Wollaston, a Hatchet, or a Murray], we find poetry, as it were, substantiated and realized." (*Shorter Works*, 1: 648-49)

John Keats

By the early 19th century, the systematization of scientific studies for younger people had not yet occurred except in the case of dissenters' academies, and the Oxford and Cambridge university curricula in practical science had not developed very far. However, medical education came of age when the 1815 Apothecaries Act was introduced. The Act made it compulsory for medical students to study anatomy, botany, chemistry, and other sciences, and to gain practical hospital experience. In 1815, John Keats who had almost finished his medical apprenticeship to a surgeon-apothecary, was enrolled as a medical student at Guy's Hospital to complete his medical training.

Relevant to this context is John Lockhart's harsh review of Keats in *Blackwood's Edinburgh Magazine* in 1818, entitled "Cockney School of Poetry." Lockhart ridiculed Keats, saying, "It is a better and wiser thing to be a starved apothecary than a starved poet" (Matthews, *Keats: The Critical Heritage*, 109-10). This criticism clearly reflects the contemporary trend towards the institutionalization of medical education; Lockhart's goal was to victimize an ex-medical student for attempting literature. He says, "This young man [Keats] appears to have received from nature talents of an excellent, perhaps even of a superior order—talents which, devoted to the purposes of any useful profession, must have rendered him a respectable, if not an eminent citizen" (Matthews, *Keats: The Critical Heritage*, 109-10). But Keats, according to Lockhart, is bewildered by poetry, which is a grievous fault. Lockhart's argument allowed no possibility of a mutual relation between scientific pursuits and literary ones; rather, the class consciousness of literary elites seemed to remove the values of liberal arts including poetry far from the practical discipline of medicine.

It seems probable that Keats's medical education gave him a keen sense of the reality of the human body as a living organism; as a medical student, he practiced dissections and other related operations. For example, in *Lamia*,

Lamia's wish gives her a human form with "the throbbing blood"(Part1, l.308).[11] This may indicate that for Keats, sensations and desires correlate to physical entities; it may also point to the fact that Keats's imagination yearns strongly for things that are tangible, audible or visible—entities of physicality. When he identifies a lack of any of those entities, he then transfers that feeling into a desire that develops his poems: the speaker of "An Ode to a Nightingale," for example, wishes to "leave the world unseen" (l. 19). Stimulated by the voice of a nightingale, to drink a "draught of vintage" (l. 11), which is not real but imaginary, the speaker's imagination is prompted to describe the bodily sensation of intoxication, associated with a sense of flying, while simultaneously assimilating this image with the invisible bird in the forest.

It seems that the question of life for Keats, during his development as a poet, had been transformed or sublimated into that of poetry or beauty. Keats's view of the human body might have developed into an aesthetic view of harmony, which sounds as if all the laws of circulation of blood and limb formulated themselves a comprehensive law of harmony of the body. What Keats tried to express in terms of Lamia's yearning for a woman's flesh indeed reflected his own sense of actuality acquired in dissecting human bodies—an overwhelming sense of the frailty of the human life regardless of a strong desire to live. Lamia, before being embodied in a female form, is first introduced as a voice which pleads for a human body, and then appears as a serpent which has "a golden shape of dazzling hue" (Part 1, l. 47), whose luster was "rainbow-sided, touch'd with miseries" (l. 54). Lycius is a young philosopher who represents the human world for Lamia; therefore to win his heart can be to win that world over. The new-born Lamia renews her old love for Lycius, and he looks back,

> For so delicious were the words she sung,
> It seem'd he had lov'd them a whole summer long:
> And soon his eyes had drunk her beauty up,
> Leaving no drop in the bewildering cup... (ll. 249-252)

From this point onto the moment when they see Apollonius, Lamia's "sure art" overpowers Lycius who becomes so enchanted that he cannot resist any temptation she contrives. But as she is a dream-construct of the desire to live in a woman's form, what the new-born Lamia can say consists only of hollow words, without any reference to her actual history. She says, "What canst thou say or do of charm enough/ To dull the nice remembrance of my home?" (ll.

[11] The texts of Keats's poems are from *John Keats: Complete Poems*, edited by Jack Stillinger.

274-75), and even continues, "What taste of purer air has thou to soothe/ My essence?" (ll. 282-83), expressing her dissatisfaction, and she cries, "Adieu!" to alienate him, which in turn so excites his sexual emotion that "He, sick to lose/ The amorous promise of her lone complain, / Swoon'd, murmuring of love, and pale with pain" (ll. 287-89). Her empty words are not empty for Lycius, however, and in a trance he is kissed; Lamia "put her new lips to his, and gave afresh/ The life she had so tangled in her mesh" (ll. 294-95). Lamia's desire is breathed into the life of Lycius, to be unified with him in body and spirit. This is, in other words, a desire to emancipate herself, from being a serpent, from being an ex-human, or from being that which has already been non-existent. The claim that she has in her veins "throbbing blood" may point to the presence of her body, the materiality of which however probably is the only measure that can consubstantiate her with him.

Keats's sense of physicality gave his poems a passion for uniting the body and the mind, or for integrating all the bodily sensations with emotions and desires. In the case of Keats's romantic medicine, it seems, medical science was not separated from poetry, but they corresponded with each other. The practical demand for scientific discipline, however, overpowered the collaborative values of poetry and science. In *Lamia*, Keats asks: "Do not all charms fly/ At the mere touch of cold philosophy" (Part 2; ll. 229-230). His reproach towards the 'cold philosophy' that would "unweave a rainbow" (Part 2; ll. 237) has been often cited as showing a hostile relation between science and poetry, namely, science had a power to destroy all poetry. But considering the social context of the age in which medical training was being institutionalized, the 'cold philosophy' might not refer to medicine itself but probably to the social power of its institutionalization. And it seems that by alluding to this social power, and with a hostile attitude towards it, Percy Bysshe Shelley, a friend of Keats, dramatizes the death of Keats in his *Adonais*. When we see that the social trend of professionalism in science underlay what was represented by Lockhart's attack on Keats, the modern issue of the 'two cultures' can find its roots in the age of the Romanticism, and the Romantic poetry may be seen as a struggle against the force to tear apart the unity of a human mind in which concerns of the spiritual and the material were interrelated.

A Last Romantic, W. R. Hamilton

In the context of the Romantic literary movement and of the professionalization of science, little attention has been paid to Sir William Rowan Hamilton (1805-65), an Irish mathematician who was a professor at

Trinity College, Dublin and the Royal Astronomer of Ireland, except that he has been briefly mentioned as one of the admirers of Wordsworth.[12] Hamilton was one of the founding members of the BAAS, yet he was also one of the most prominent proponents of the idea of the unity of science and poetry. In his twenties, Hamilton was so enthusiastic about the Romantics that he went first to see Wordsworth in the Lake District, and secondly to visit Coleridge at Highgate, London.[13] In 1832, Coleridge attended the second annual meeting of the BAAS in Cambridge, escorted by his medical friends, James Gillman and Joseph Henry Green.[14] Hamilton welcomed Coleridge with other men of science and sat next to him at a dinner table. He remembered that Coleridge was, in spite of his declining health, in good spirits and sociable enough to make a joke (Cf. Graves, 2: 623). While he continued to visit Wordsworth in the Lakes until the death of the poet, Hamilton was influenced by Coleridge's philosophy, studying Kant's *Critiques*. One of his mathematical works that was derived from his philosophical speculations was "Algebra as the Science of Pure Time."[15] Aubrey de Vere, a poet and his close friend, wrote a letter to Coleridge's daughter Sara in which he says: "Hamilton used to tell me that the shallow views of almost all the scientific men whom he met at the British Association made him melancholy; and that nearly the only Englishman of our time whom he regarded as a *philosopher* was Coleridge" (*Recollections,* 200).

Hamilton believed that the perfection of the mind could be attained by pursuing higher purposes such as those finely expressive of the depths of human souls, as are poetry or even mathematics. He later believed one of his master works, *Lectures on Quaternion* published in 1853*,* to be comparable to Alfred Tennyson's "Princess*,*" as he considered them to be twin intimates of the contemporary quintessence of science and poetry. In 1855, he wrote to Robert Percival Graves who later became his biographer, about his reading of Tennyson's "Princess," and went on to say as follows:

> I have lately been reading, over & over, for I do not pretend to calculate how many times, the "Princess". I may indulge the hope, at moments, that as I now read with profit & delight the book of the great Grecian Mathematician, Apollonius of Perga*... after an interval of two thousand years from its composition, so my own volume [namely, *Lectures on Quaternions*] (of which I should be happy, if you thought that you could manage it to present Mr. Tennyson with a copy) may survive even several centuries –. Nay, that as the earliest work in its own department, it may exist till books shall be no more. But it deeply

[12] For example, see Gill's biography of Wordsworth, 355.
[13] As for details of their meetings, see, Ishikura, "Coleridge's Poetic Ally."
[14] James Gillman was a medical practitioner at Highgate; in his house Coleridge lived in with the Gillmans for more than eighteenth years. Joseph Henry Green was the Hunterian professor of comparative anatomy, and a philosophical executor of Coleridge.
[15] See, Hankins 258-267.

> presses on my reflection, how much wiser a book is Tennyson's "Princess" than my "Quaternions."[16]

Modern readers may be surprised at Hamilton's exalted feeling about his own book, *Lectures on Quaternions*, and his comparison of it with Tennyson's "Princess." Graves recollects in his biography that he discouraged Hamilton from sending a copy to Tennyson by arguing that he "could receive no reciprocal enjoyment from the book." (Graves, 3: 187). It seems that his pursuit of mathematics gave Hamilton a sense of being a divine servant of a higher purpose, one in which poetry and science went go hand in hand. The following remarks by Hamilton in his *Introductory Lecture on Astronomy* in 1832 contain one of the most impressive statements he ever made about the alliance between science and poetry:

> With all the real differences between Poetry and Science, there exists, notwithstanding, a strong resemblance between them; in the power which both possess to lift the mind above the stir of earth, and win it from low-thoughted care; in the enthusiasm which both can inspire, and the fond aspirations after fame which both have a tendency to enkindle; in the magic by which each can transport her votaries into a world of her own creating… (Graves, 1: 652)

Hamilton never discarded this dream until his death. However, he was estranged himself from the movement of institutionalization of scientific studies in the Great Britain. He never became a member of the Royal Society of London, being distanced from the Cambridge mathematical school, and remained encased in the Dunsink Observatory without doing any astronomical observations. He said: "The stars move all right; but what interests me is the high *mathesis* that accounts for their movement." (De Vere, 47). However high his aspiration soared, however diligently he might have written mathematical theses and letters with poems, he yet gradually became a lonely figure, caught in the age when Anglican culture suffered its decline in Ireland.

Hamilton is now remembered as a mathematical genius who invented the Hamiltonian which has been used in quantum mechanics, and discovered quaternions. His literary interests are scarcely considered as a matter of importance. Although his poems are not first-rate, and he never published his literary works, it seems important to take into account the literary context of the age when considering Hamilton and other men of science in the 19th

[16] Trinity College Library, Dublin, MS 1275. Graves cites this letter, with a different emphasis on some words, in the last part of his *Life of Hamilton*, with the following note: "... with regard to his notion of sending to Tennyson in return for pleasure and benefit derived from his poetry a copy of the *Lectures on Quaternions,* I remember discouraging it, on the ground that the poet could receive no reciprocal enjoyment from the book, which in my opinion, was of too great importance to be used as a mere *token* of homage and obligation" (Graves, 3: 187).

century, as he was not an exception, but one of many scientists showed interests in poetry or literary works. Dealing with Hamilton with exclusively mathematical interests, it seems, is one of the results of the 20th century trend in scientific studies which claim to be self-sufficient within established scientific paradigms.

Abbreviations

BL: Coleridge, Biographia Literaria.
CL: Coleridge, Collected Letters.
CN: Coleridge, The Notebooks of Samuel Taylor Coleridge.
CM: Coleridge, *Marginalia*.
PW: Coleridge, Poetical Works.

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Bio-bibliographie

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