Coleridge and the science of life

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Abstract: In this chapter I examine Coleridge's *Theory of Life* in the context of a dispute in British medical institutions concerning the scientific status of comparative anatomy. I argue that Coleridge envisaged *Theory of Life* as a Hunterian Oration, centered on the provocation that comparative anatomy is properly organised under the idea of life. I then demonstrate how Coleridge's method for a comparative science impacted several key figures in British bioscience, including Joseph Henry Green, William Whewell and Richard Owen. I conclude that Coleridge's ability to adopt, transform and apply the insights of German physiology to the scientific debates in London's intellectual circles played a greater role the development of comparative anatomy in Britain than has previously been recognised.

'it will not surprise us, that Plato so often calls Ideas living laws, in which the mind has its whole true being and permanence; or that Bacon, *vice versa*, names the laws of nature Ideas.' (*F* III 164)

1. Introduction

It has been well noted that Coleridge's encounter with dynamic theories of physics and chemistry at the close of the eighteenth century led him to reject his youthful commitment to David Hartley's empiricism and to develop a new method for natural science inspired by Plato, Bacon and Kant.[1] Through his encounter with Thomas Beddoes' circle of chemists and physicians in Bristol, Coleridge became convinced that corpuscular philosophy, in the guise of epistemic modesty, strips reason from nature and reduces the material world to 'an immense heap of little things' (*CL* I 349).[2] Following his return from Germany in 1799, he set out to demonstrate to his British peers that the corpuscular school 'has received a mortal blow from the increasingly dynamic spirit of the physical Sciences' (*AR* 395). For Coleridge, this dynamic spirit, manifest in Galvini's discovery of animal electricity and Lavoisier's revolution in chemistry, vindicated a new conception of matter imbued

[1] McFarland, 'A Complex Dialogue'; Sloan, 'Whewell's Philosophy of Discovery'; Knight, 'Coleridge and Chemical Philosophy'.

[2] Citations to Coleridge's work are in text, and use the following abbreviations: *AR* = *Aids to Reflection*; *BL* = *Biographia Literaria*. *C&S* = *On the Constitution of the Church and State*; *CL* = *Collected Letters of Samuel Taylor Coleridge*; *CN* = *The Notebooks of Samuel Taylor Coleridge*; *TL* = *Theory of Life*; *SW* = *Shorter Works and Fragments*; *F* = *The Friend*.

with inner forces. The challenge was to persuade Britain's gentlemen of science that these developments presuppose a rationally ordered cosmos.

While scholars have identified the significance of physics and chemistry to Coleridge's writings on scientific method, his impact on comparative anatomy and zoology has received far less attention.[3] This is partly due to the interpretive difficulties surrounding *Theory of Life*, his most extended treatise on the subject. Yet it is also due to a widespread view that the Romantic conception of nature Coleridge sought to animate in Britain was an eclectic fusion of European ideas, out of step with British anatomy and physiology.[4]

In this paper I reexamine Coleridge's *Theory of Life* in the context of a dispute in British medical institutions concerning the scientific status of comparative anatomy. While there is no evidence that the text was widely read, I argue that Coleridge's involvement in Britain's scientific intuitions ensured that his argument nevertheless had a decisive impact on comparative anatomy. I begin in Section 2 by situating Coleridge's early interest in German physiology within the contested landscape of British natural science. In Section 3 I examine the interpretive issues surrounding *Theory of Life*, and propose a contextual method for interpreting its impact. In Section 4 I summarise its main arguments, giving particular focus to Coleridge's central claim that comparative anatomy is properly organised under the idea of life. In Section 5 I demonstrate how the method outlined in *Theory of Life* impacted the work of several key figures in British bioscience, including Joseph Henry Green, William Whewell and Richard Owen. I conclude that Coleridge's ability to adopt, transform and apply the insights of German physiology to the scientific issues debated in London's intellectual circles played a greater role in the development of comparative anatomy in Britain than has previously been recognised.

2. British anatomy and German philosophy

To understand Coleridge's argument in *Theory of Life*, it is vital to begin with the broader intellectual milieu in which British anatomists and surgeons played a central role in a Europe-wide discussion concerning a unified science of the animal body. In 1786-7, the Scottish surgeon John Hunter delivered a series of lectures at London's Royal College of Surgeons in which he called for a new movement of surgical practice. Hunter's lectures sketch an experimental science of practical anatomy based on a 'simple principle of life.'[5] This principle is independent of organic structure and resident in entities that are capable of instigating their own beginning. In such entities, matter is

[3] Several scholars have challenged this view, including Desmond, *The Politics of Evolution*, 262, and Rajan, 'Immunitary foreclosures', 42. Yet they do not question the accepted line that Coleridge's Romanticism was surpassed by Darwin's materialist conception of comparative anatomy.
[4] For a typical account of this view see Beach, 'Coleridge's Borrowings from the German', 39. My argument builds on recent work that challenges this view, including Sloan, 'Kant and British Bioscience', and Richards, 'The Impact of German Romanticism on Biology in the Nineteenth Century'.
[5] Hunter, *Lectures on the Principles of Surgery*, 20.

subject to higher order laws that cannot be reduced to their mechanical properties, manifesting a vital power that resides in the blood. Hunter's audacious goal was to replace the Galenic theory of humours with a materialist theory of the animal body, an affront to the established medical profession that saw his lectures remain on the margins of British natural philosophy. His lectures were more widely read on the continent, where they resonated with work of German-speaking physiologists such as Albrecht von Haller.[6] Like Haller's two life forces (irritability and sensibility), Hunter's vital power operated as a Newtonian experimental postulate, irreducible to manifest physical properties. This placed a significant interpretive burden on his readers, for, like all Newtonian forces, the metaphysical status of Hunter's principle was extremely ambiguous. While it might open a new classificatory scheme of animal bodies, it remained unclear how it could be used in the treatment of diseases.

In the mid-1790s, the Edinburgh physician John Brown rose to prominence in German medical departments for announcing a new 'science of life' in which a basic force is examined in the same manner as the forces studied in physics and chemistry.[7] In *Elementa Medicinæ* (1780), Brown defined life as a 'forced state' in which the power of 'excitability' is dynamically balanced with external 'exciting' effects.[8] He insisted that while 'we know not what excitability is, … a certain portion is assigned to every being upon the commencement of its living state.'[9] The living body can thus be understood as a local economy in which excitability forms the quantifiable basis of medical practice. Disease is a state of imbalance that occurs through a deficiency or excess of excitability, which can be measured and placed on a scale of severity. Medical interventions serve to stimulate or depress the organism's intrinsic activity, assisting it to return to its desired state of balance.

The possibility of a Brunonian science of medicine had an enormous impact on the progressive medical departments of Bamberg and Göttingen during the 1790s, where physicians including Christoph Girtanner, Christoph Heinrich Pfaff and Andreas Röschlaub attempted to refine the systematic character of medical practice. Girtanner claimed that Brunonianism could, with certain modifications, become 'nothing less than a complete system of the science of medicine.'[10] Röschlaub argued that Brown 'elaborated the only true principles for the whole organic doctrine of nature', for he was the first to understand that 'life is neither absolutely passive nor absolutely active.'[11] This Germanic conception of Brunonianism inspired Thomas Beddoes to publish a revised English translation of Brown's *Elementa Medicinæ* in 1795, which received far more attention in Britain than the original publication.[12] In his biographical introduction to the translation, Beddoes presented

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[6] Abernethy makes this point in his Hunterian Oration of 1819. See Abernethy, *The Hunterian Oration for the Year 1819*, 27.
[7] Brown, *Elements of Medicine*, xxvii. For a summary of Brown's reception in Germany, see Tsouyopoulos, 'The Influence of John Brown's Ideas in Germany.'
[8] Brown, *Elements of Medicine*, 34.
[9] Brown, *Elements of Medicine*, 7.
[10] Girtanner, *Ausführliche Darstellung des Brownischen Systemes der praktischen Heilkunde*, v.
[11] Röschlaub, *Untersuchungen über Pathogenie*, 246.
[12] Knight, 'Coleridge and Chemical Philosophy', 98.

Brown's work through the systematic interpretation developed by Girtanner and Röschlaub.[13] In 1798, Beddoes established the Pneumatic Institution in Bristol with the intention of 'applying chemistry to the elucidation of animal nature, principally by pursuing the connection between the properties of elastic fluids, and the conditions of life.'[14] With the young chemist-physician Humphry Davy, he attempted to apply Joseph Priestley's experiments on air in surgical practice to test how various excitants might restore diseased patients to health. In the first proceedings of the Institution, Beddoes records 'S. T. Coleridge' among the early participants in experiments with nitrous oxide.[15]

Coleridge had arrived in Bristol to work alongside Beddoes and Davy in 1795. In 1798, he travelled to Göttingen – presumably on Beddoes' recommendation – to discover more about Brunonian medicine and its philosophical underpinnings.[16] Under the supervision of Christian Gottlieb Heyne and Johann Blumenbach, Coleridge developed a working knowledge of German physiology and metaphysics (*CL* I 518). His stay in Göttingen coincided with several dramatic events in the German academy, including Fichte's forced resignation from Jena and Schelling's proposal for a new philosophy of nature on Brunonian principles. Both events alerted Coleridge to the significance of Kant's critical philosophy for the construction of a new experiential science, and yet it was not until he returned to England in June 1799 that he was able to undertake 'the most intense Study' of Kant's works (*CL* II 706; see also *CN* I §887). Coleridge was particularly taken by Kant's separation of *Verstand* (understanding, or representational thinking) and *Vernunft* (reason, or conceptual thinking), which undercut the associationist conception of thought in which ideas are formal impressions left on the intellect. On Kant's theory of mind, the understanding is an active and spontaneous power that, following the structure of Brown's excitability, functions as a qualitative response equal to sensory stimulation. Under the stimulation of sense data, the understanding applies determinate concepts in judgment to construct the manifold of perception as intelligible objects. Reason dynamically produces ideas that transcend possible objects, projecting the inferential relations in which the understanding's cognitions can find their location and ground.

While Coleridge retained Kant's distinction between the understanding and reason, he agreed with Fichte and Schelling that transcendental philosophy remained one-sided. For Kant, the understanding prescribes the laws of nature studied in physics. Reason's ideas govern the organisation of the understanding's cognitions, and yet have no direct purchase on nature. Fichte and Schelling claimed that while transcendental philosophy vindicated the *a priori* knowledge of natural laws, Kant failed to stitch the causal order of the understanding back together with reason's dynamic power. Fichte's solution was to ground the theoretical side of Kant's philosophy in the practical activity of

[13] For a discussion of Beddoes' role in the transposition of Germanic ideas to the British Isles, see Cooper, 'Reading Kant's *Kritik der Urteilskraft* in England, 1796–1840', 474-478.
[14] Beddoes, *Notice of Some Observations Made at the Medical Pneumatic Institution*, 3.
[15] Beddoes, *Notice of Some Observations Made at the Medical Pneumatic Institution*, 40.
[16] Vickers, *Coleridge and the Doctors*, 54-55.

the transcendental I. Schelling agreed that the activity of thought must provide the basis of the philosophical system, yet he rejected Fichte's claim that nature is a product of mind. He argued that the mind must grasp *itself* as a product of nature, such that reason's ideas are part of the natural order.[17] For Coleridge, Schelling's *Naturphilosophie* provided the foundation for a dynamic conception of the intellect that could recover nature from the abstraction of corpuscular philosophy. It demonstrated that natural science requires the synthetic work of philosophy, which searches for the ideal in the real (*CL* IV 769).

Coleridge's encounter with Germanic ideas was framed within a broader discussion taking place within British medical communities, especially the Pneumatic Institution and the Royal College of Surgeons.[18] In contrast to Hartley's empiricism, in which reason simply associates ideas in the mind, the idealist current in German and British physiology offered to Coleridge a vision of philosophy that influences scientific practice. Building on Schelling's *Naturphilosophie*, Henrik Steffen's argued in *Contributions to the Inner Natural History of the Earth* (*Beyträge zur innern Naturgeschichte der Erde*, 1801) that nature, grasped philosophically, is moved by a fundamental principle of polarity. Matter consists in the opposition of length and breadth, magnetism in opposite poles, electricity in positive and negative channels, and physiological movement in receptivity and activity. The 'forced state' of Brunonian medicine is not an isolated condition of living bodies but a natural achievement in a system of ascending complexity of which the mind, as the highest rung, has become conscious. In a note from May 1819, Coleridge states that

> Receptivity, or Excitability, at one pole, and Agency or Excitancy […] at the other, are the opposite states in which the **one** Activity, of Nature, which is the Substance of both, and their identity, reveals itself. There can be no *Product* without an Antecedent Power, that produced it, and is known to *be*, and to be that particular Power, by that <particular> Product. In relation to Existence, the Power determines the Product; in relation to our *knowledge* of its Existence, the Product determines the Power. (*CN* §4538)

Following Steffens, Coleridge identifies the Brunonian forces of excitability and excitancy with the cognitive forces of receptivity and spontaneity, signalling his intention to ground the mind in nature understood as a dynamic process. The continuity of mind and nature serves as the metaphysical foundation for scientific investigation. That is, it vindicates the quasi-transcendental assumption that the laws of nature are intelligible, for laws are the objective side of the mind's ideas (*C&S* 12). The

[17] In the 'First Outline', Schelling presents his program of *Naturphilosophie* as a direct outworking of his research on Brunonian medicine with Röschlaub: 'Most partisans did not understand the scientific meaning of Brown's principles, … with one exception, Röschlaub, whose works everyone who has a sense for scientific medicine must study.' Schelling, *Erste Entwurf*, 91.
[18] For a survey of Coleridge's encounter with Brunonianism, see Vickers, *Coleridge and the Doctors*, ch. 2.

Platonist pairing of law and idea collapses the Kantian distinction between nature and freedom, such that an idea simply *is* a law considered subjectively. The natural philosopher is justified in anticipating a governing power for every natural product, for

> an idea … is in order of thought always and of necessity contemplated as antecedent. In the idea or principle, Life, for instance – the vital *functions* are the result of the organization; but this organization supposes and pre-supposes the vital *principle*. The bearings of the plants on the sun are determined by the ponderable matter of which they consist; but the *principle* of gravity, the *law* in the material creation, the *idea* of the Creator, is pre-supposed in … the very concept of the existence, of matter itself. (*C&S* 20)

Coleridge insists that ideas anticipate the results of empirical research by directing inquiry in search of the lawfulness of empirical objects. Empirical objects can then be examined in terms of these idealisations; the functions of living beings, for instance, can be examined *as functions* only by presupposing a principle of life. This entails that comparative anatomy is not only concerned with the structural adaptations of living beings in a given environment, but also with the principle of actuality that gives rise to those adaptations. To grasp the driving force of anatomical change requires a principle of individuation, which realises the potential of lower levels of organisation. Yet what is such a principle, and by what method might it be discovered?

3. *Theory of Life*

In *Theory of Life*, Coleridge sets out to determine the principle of life and to show how it can unify comparative anatomy as a science. Before turning to his argument, it is important to address several interpretive difficulties that have hindered serious engagement with the text. The first concerns authorship. *Theory of Life* was first published as *Hints Towards the Formation of a more Comprehensive Theory of Life* in 1848 by Seth Watson, who was virtually unknown to the community of scholars associated with Coleridge's estate. Watson included a brief forward to the original publication in which he notes that the manuscript had rested first in the possession of James Gillman in Hampstead and then with him in Cambridge, yet he said nothing about when the text was written or whether he or Gillman had worked on it in collaboration with Coleridge. Someone alerted the publishers to this at the last minute, for a leaf was inserted into some copies of the first edition stating that it had been brought to their attention that, after the initial print run, the work 'might with more propriety be considered as the joint production of Mr. Coleridge and the late Mr. James Gillman of Highgate.' Nevertheless, *Theory of Life* was included in the 1885 volume of W. G. T. Shedd's *Complete Works of Samuel Taylor Coleridge*, much to the irritation of an early reviewer, who claimed that 'we have yet to learn what is the sufficient authority for the assertion that this treatise ever came

either from the writing pen or speaking tongue of S. T. Coleridge.'[19] The matter was not resolved until the twentieth century, when scholars discovered a letter from Coleridge's daughter Sara in which she explains that it is not a work of collaboration but directly employs the ideas and phrases form her father's published works and goes beyond the works of Gillman and Watson.[20]

Neither Watson's introduction nor Sara's letter shed light on the date of composition. Several proposals have been made, ranging from 1816 to 1831.[21] Those who claim that the text was composed in the final months of 1816 call on Coleridge's frequent reference to Steffens in his notes during that time (see *CN* IV §§4652, 4662, 4775-6).[22] Yet given that *Theory of Life* favours Steffens' graded system of ascent over Schelling's idealism, and given that Coleridge had a standing order for Steffens' works in June 1817 (*CL* IV 738), it seems that 1819 – the year following Coleridge's break with Schelling – is a more likely candidate.[23] In a note from 1820, Coleridge calls on Steffens to clarify the differences between his own system and that of Schelling, which 'are not momentary but essential' (*CN* IV §4778). 'Let me not fail to declare that in the different several works of H. Steffens', he writes, 'especially in his *Beyträge zur innern Naturgeschichte der Erde*, the Spirit within me bears witness to the same Spirit in him' (*CN* IV §4778).

This 'same spirit' Coleridge discovered in Steffen raises an additional question of originality. In the 1930s, Henri Nidecker published a series of papers in *Revue de Littérature* in which he identifies eighteen passages from *Theory of Life* taken almost directly from Steffens' *Beyträge*.[24] While Coleridge embellishes Steffens' text at certain points, often to dramatize the uniqueness of the idea in its historical setting, his phrasing mirrors Steffens' original formulation. In the following sections I aim to steer between two interpretive strategies found in the literature. The first is dismiss Coleridge's borrowings as having no bearing on the text. C. U. M. Smith for instance argues that they are of 'no great importance to those of us interested in the nineteenth-century alternative to Darwinism and the influence of Coleridge's ideas on the development of comparative anatomy.'[25] After all, does not Coleridge speak of truth as a 'divine ventriloquist' in *Biographia Literaria* (*BL* 81)? Yet Coleridge's borrowings *are* significant for understanding the nineteenth century alternative

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[19] Anon., 'Coleridgeana I: The New Edition of Coleridge', 264.
[20] Namely, she criticises Watson's decision to publish the text without consultation on the grounds that the lack of clarity left the authorship of the text in doubt. Sara's letter is reproduced in Haeger, 'Composition and Date of *Theory of Life*', 23.
[21] The reviewer in *Review of English Studies* argues for a date shortly after Coleridge's letter Gillman in 1816 that touches on several issues pertinent to *Theory of Life*. See 'Coleridgiana', 443-4. Ashe claims that the text must be dated before 1831 in Coleridge, *Miscellanies, Aesthetic and Literary*, 364. Jackson and Jackson, the editors of *SW*, state that *Theory of Life* 'seems to have been written rapidly in Nov–Dec 1816' (*SW* I 481).
[22] See for instance Levere, *Poetry Realized in Nature*, 216.
[23] For instance, in a marginal note of his copy of Steffens' *Grundzüge*, Coleridge rejects Schelling's claim that the gradient from 'the Insect, the Fish, the Bird, the Beast is *blosser Schein*' (*CM* V 360). I thus agree with Haeger that 1819 is the most probably date of composition. See Haeger, 'Composition and Date of *Theory of Life*', 38.
[24] Nidecker, 'Notes Marginales de S. T. Coleridge, IV', 870-1.
[25] Smith, 'Coleridge's "Theory of Life"', 40.

to Darwinism, precisely because he refined his position through Steffens' critique of corpuscular philosophy. The second strategy is to read the text as testament to Coleridge's awareness of his ailing creativity and drug-ridden malaise, which, to use Joseph Beach's words, drove him to 'literary dishonesty and a vanity that cannot bear to credit another with anything that may possibly be passed off for one's own.'[26] Beach's disparaging critique rests on a problematic assumption that originality is the sole criterion of intellectual merit. Not only does this assumption accept Coleridge's dubious and self-styled conception of genius, it also overlooks the fact that the transmission of ideas can be a major intellectual achievement.[27] The historical significance of Coleridge's account of life can be better understood, I suggest, if we consider how he works creatively with Germanic ideas to defend comparative anatomy against threat of materialism.

4. Life as the principle of individuation

Coleridge envisaged *Theory of Life* as a Hunterian Oration, an annual lecture held at the Royal College of Surgeons bound by statute to promote Hunter's pioneering ideas and to apply them to the collection held at the College's anatomical museum. The orator of 1817, Hunter's disciple John Abernethy, opened his address by praising Hunter for providing a philosophically sound 'theory of life' that is 'adequate to explain the phenomena' of medical science.[28] Abernethy used the oration to settle an ongoing debate with the surgeon-anatomist William Lawrence, who ridiculed all vital principles and life forces as poetic personifications of nature.[29] To defend Hunter's legacy from Lawrence's materialism, Abernethy presented his teacher as Britain's Haller, a faithful Newtonian who did not consider the principle of life as a metaphysical postulate but as a placeholder for an unknown force that one can 'uphold … as a good theory till a more satisfactory one is found.'

Abernethy was sympathetic to Coleridge's critique of materialism. He had attended Coleridge's lectures at the Crown and Anchor in 1818, which he cited in the oration against Lawrence.[30] Several notes from April 1819 suggest that Coleridge attended Abernethy's oration, or at least that he read the transcript published later that year (*CN* §4518, §4521). Yet Coleridge was unconvinced that Abernethy's defense of Hunter provided a genuine alternative to materialism. *Theory of Life* presents an alternative account of Hunter's life principle, perhaps one that Coleridge hoped could be delivered at the College's invitation.

Coleridge opens the text with the conventions of a Hunterian Oration. He praises Hunter's pioneering work, anticipates future developments of Hunterian scholarship, and demonstrates how

[26] Beach, 'Coleridge's Borrowings', 50.
[27] Here I agree with Class, who claims that it 'is time for the studies of Coleridge's reception of German philosophy to relinquish "individuality" and "originality" not as a subject of investigation but as a criterion for our assessment of the writers' respective significance and merit.' Class, *Coleridge and Kantian Ideas in England, 1796-1817*, 4-5.
[28] Abernethy, *Physiological Lectures*, 2.
[29] For an account of the debate, see Desmond, *The Politics of Evolution*, 117-21.
[30] See Levere, *Poetry Realized in Nature*, 46.

these developments might apply to the anatomical collections at the College. Yet Coleridge had long been critical of Hunter for restricting the life principle to the blood, which, in keeping with Haller's Newtonianism, assumes an ontological break between living and non-living matter.[31] He laments the fact that Abernethy failed to develop the consequences of his conclusions systematically, and carry them 'yet further back, to their ultimate principle' (*TL* 19/*SW* I 487). To complete this task, and to demonstrate how comparative anatomy could be organized under a single principle, Coleridge examines three strategies that physiologists have used to define life over the past half-century, each of which turns out to be hopelessly circular.

The first is to translate the word *life* into 'other more learned words; and this paraphrase of the term is substituted for the definition of the thing' (*TL* 22/*SW* I 489-90). Coleridge's target here is not only Lawrence but also the French physiologist Xavier Bichat, who defined life as 'the sum of all the functions by which death is resisted.'[32] Bichat had come into vogue in 1815 when, following the Napoleonic wars, students were able to travel to Paris to attend his famed lectures on materialist medical science.[33] His definition leads physiology to a dead end, Coleridge contends, for it is nothing other than the circular claim that 'life consists in being able to live' (*TL* 22/*SW* I 489).

The second strategy is to take 'some one particular function of Life common to all living objects – nutrition, for instance; or, to adopt the phrase most in vogue at present, assimilation, for the purposes of reproduction and growth' (*TL* 23/*SW* I 490). The functionalist approach isolates a relevant capacity found in every instance of life, and then reasons back to some basic organ or system in which its telic relation is intelligible. Yet this strategy is also circular, Coleridge argues, for it presupposes the organized state to which the isolated function contributes. It thus accepts an ontological break between living and dead matter, and thereby blocks the physiologist from grasping the generative process in which functions arise. Here we begin to catch a glimpse of Coleridge's alternative determination of life. In contrast to a lexical definition, a physiological determination 'would be a history, not a definition' (*TL* 25/*SW* I 492). A history would give expression to 'the *law* of the thing' in which 'all the properties and functions are admitted by implication', giving 'insight into the necessity and *generation* of the phenomena of which it is the law' (*TL* 25/*SW* I 493).

Before elaborating on what kind of law he has in mind, Coleridge interrogates a third strategy of defining life: to search out 'some property characteristic of all living bodies', such as 'anti-putrescence' or 'the power of resisting putrefaction' (*TL* 27/*SW* I 494). At first glance, this strategy looks more promising than the first two, for a property denotes something internal and irreducible to mechanical analysis. Yet like the first two strategies, Coleridge argues that it confines the idea of life

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[31] Coleridge was critical of Hunter's principle from as early as 1796. In a letter to Thelwall, he notes that Hunter held 'that the *Blood* is the Life – which is saying nothing at all – for if the blood were *Life*, it could never the otherwise than Life' (*CL* I 295).
[32] See Bichat, *Physiological Researches on Life and Death*, 1-2.
[33] Knight, 'Coleridge and Chemical Philosophy', 97.

to organised beings discernible by us. While it is preferable to both Bichat's materialism and Haller's mechanism, for it opens the language of powers, at best it 'describes the *vis vita* by one of its many influences' (*TL* 27/*SW* I 495). That is, it defines an emergent property and fails to work back to 'the law or principle of action.'

The thrust of Coleridge's argument is methodological. The three strategies of defining life commence with the representational thinking of the understanding, which attempts to define a concept through analysis of its content. Brunonian medicine takes us beyond the representational stasis of the understanding, for it considers life as an idea manifest in the dynamism between stimulus and response. Siding with the German physiologists, who attempted to elevate Brown's principle into a positive philosophy, Coleridge identifies the principle of life with the mind itself, that is, with the locus of activity that is undertaking the inquiry.

Coleridge discovered Steffens' *Beyträge* to be the perfect vehicle to advance British comparative anatomy, for it identifies the principle of life as the culmination of a history of errors made by natural philosophers.[34] As we saw in the lengthy passage borrowed by Coleridge, Steffens argued that these errors stem from a well-established method that examines life as objectivity, an occult quality or unknown power that is knowable only through its effects. This method assumes the separation of ideas, understood as subjective reconstructions of objectivity, from nature, such that the naturalist must somehow leap from mind to the objective world. Instead, Steffens begins with nature's subjective side – what is immediately given to the mind as a dynamic, generative power – which he aspires to reconcile with objectivity. Coleridge saw that by avoiding the 'arbitrary distinction' between mind and nature, Steffens 'fills up the arbitrary chasm between physics and physiology, and justifies us in using the former as means of insight into the latter, which would be contrary to all sound rules of ratiocination if the powers working in objects of the two sciences were absolutely and essentially diverse' (*TL* 40/*SW* I 509). By replacing the hard distinction of kind with a continuous gradient of degrees, he returns us to the 'essential vitality of nature, that she does not ascend as links in a suspended chain, but as the steps in a ladder' (*TL* 41/*SW* I 509). The assent of nature is universal such that even 'the life of metals, as the power which effects and determines their comparative cohesion, ductility, etc.' exists on the same scale as 'the Life which produces the first attempts of organization, in the almost shapeless tremella, or in such fungi as grow in the dark recesses of the mine' (*TL* 40/*SW* I 508).

In contrast to Hunter's conception of life as an experimental postulate, Coleridge aims to complete the Brunonian vision of a medical science by showing how the idea life can be grasped as 'the internal copula of bodies', that is, 'the power which discloses itself from within as the principle of the unity in the many' (*TL* 42/*SW* I 510). Once more he follows Steffens by transgressing Kant's attempt to limit reflecting judgment to the mere estimation of a vital power manifest in the dynamic

[34] Steffens, *Beyträge zur innern Naturgeschichte der Erde*, 37-38.

relation of part and whole. Yet Coleridge's method grants a more explicit role to reason than can be found in Steffens' *Beyträge*. While the understanding cuts, divides and defines, Coleridgean reason grasps the law of generation as a *causal* principle, the internal copula that explains the *generation* of living beings. This opens Coleridge's own definition of life as 'the *principle of individuation*, or the power which unites a given *all* into a *whole* that is presupposed by all its parts' (*TL* 42/*SW* I 510). The link that combines the whole and the parts, and acts throughout both, is 'the *tendency* to *individuation*.'[35] Where corpuscular philosophy reduces the diversity of properties to a homogenous substance, Coleridge's principle of life opens a philosophy of assent. As we reflect on the steps between physics, chemistry and physiology, the lower powers are not destroyed by higher forms of life but are assimilated within them, such that in the transition from chemistry to physiology, elasticity appears as the responsiveness of muscle fibres. Electricity and irritability are 'but degrees and different dignities of one and the same tendency' (*TL* 43/*SW* I 511). Life can thus be presented as a series of steps:

1. Life as the mere unity of powers,
2. Evolution of the simplest forms of totality,
3. The vast formations studied in geology and history,
4. The 'tendencies of the Life of Nature to vegetation or animalization.' (*TL* 48/*SW* I 516)

Note that it is only on the fourth step that we encounter organic unity. This step requires its own cascade of divisions, ranging from the lowest vegetable to the highest animal. In the human being, the tendency to individuation is not only perfected but begins 'a new series beyond the appropriate limits of physiology.' Life is the tendency to individuation, such that 'the degrees or intensities of Life … consist in the progressive realization of this tendency' (*TL* 49/*SW* I 517).

Having defined the principle of life in terms of individuation, Coleridge sets out to show how nature and its laws can be determined beneath it. A law, he explains, is the cause of union, from which we can derive the necessary unification of the phenomena for which it is a law. The most general law is polarity, or 'the essential dualism of Nature, arising out of its productive unity, and still tending to reaffirm it, either as equilibrium, indifference, or identity' (*TL* 50/*SW* I 518). The productivity of the polar relation is thus incompatible with mathematical calculus. It is manifest in the copula that unifies the three dimensions of matter expounded by Schelling and Steffens:

Power of length (magnetism/reproduction)

[35] This locution is Coleridgean. Steffens speaks of the '*Production des Individuums*', which is a tendency in nature toward the '*Production der Gattung*', and the '*centripetale Tendenz* der ganzen Natur', which is revealed most fully in the human being. But he does not refer to a tendency to individuation. Steffens, *Beyträge zur innern Naturgeschichte der Erde*, 310.

Power of surface (electricity/irritability) Life as the copula of constituent forces
Power of depth (chemical affinity/sensibility)

Length, breadth and depth are the three dimensions of matter that correspond the linear axis of magnetism, the electrical charge given to bodies, and the inner chemical effects of a galvanic cell.[36] Together they give rise to three-dimensional matter, and in turn to the cosmos, such that life is properly understood as their unity. In contrast to materialism, this dynamic foundation grounds a program of comparative anatomy as a series of transitions united under the principle of life. The transition of vegetables to insects is marked by the intensification of sensibility, and the transition from insects to fishes by the intensification of the reproductive force. Each of the following transitions – to birds, quadrupeds and finally to humans – is marked by increasing individuation of the living forces. While nature unfolds according to a purpose, this purpose is not preordained but rather a process of becoming that moves toward ever-increasing complexity.

5. The philosophy of biology

In *Theory of Life*, Coleridge takes over Abernethy's confrontation with Lawrence's materialism to advance Hunter's one-sided principle with thirty years of research conducted in Germany since Hunter's original lectures. Drawing from Steffens, he attempts to convince his British contemporaries that Hunter's principle requires a philosophical grasp of life if it is to explain nature's inner dynamism and creative power. In this final section I suggest that while there is no evidence that *Theory of Life* made it beyond the hands of Gillman and Watson, the text nevertheless offers a window into his conversations with members of the Royal College and the British Association for the Advancement of Science (BAAS) in the years following 1819. In agreement with Philip Sloan, I reject John Stuart Mill's notion of a 'Germano-Coleridgean Doctrine' as a way of framing this conversation, which conveys a unified ideology in opposition to mainstream British natural philosophy.[37] Yet I also avoid Sloan's notion of a 'Coleridgean methodology', which glosses over the distinct research programs advanced by each of Coleridge's interlocutors.[38] Instead, I examine the work of three prominent members of the BAAS to identify a structural similarity with the argument of *Theory of Life*, indicating that it had at least some of its intended impact, even if it was not widely read.

[36] For an account of Coleridge's use of length, breadth and depth in relation to Schelling and Steffen's readings of Kant's *Metaphysical Foundations*, see Levere, *Poetry Realized in Nature*, 116-121.
[37] Mill, 'Obituary on Samuel Taylor Coleridge', 403.
[38] Sloan, 'Whewell's Philosophy of Discovery', 40. For a politized version of Sloan's position, see Desmond, *The Politics of Evolution*, 260-275.

Joseph Henry Green

During his time as a young surgeon at St Thomas's Hospital in London, Joseph Henry Green was a member of Coleridge's Thursday class on literary criticism and German philosophy. In 1817, he travelled to Berlin to study philosophy under Wilhelm Solger, and on return he met weekly with Coleridge to discuss the writings of Kant and Schelling (*CL* II 688). In 1824, Green was appointed to the Hunterian lectureship in comparative anatomy at the Royal College of Surgeons, which required that he offer four annual series of twelve lectures. He undertook the task in collaboration with Coleridge (*CL* V 495), and used the opportunity to sketch a philosophically-based method for comparative anatomy that bares several parallels with the second half of *Theory of Life*.

Green's lectures at the Royal College of Surgeons attracted an invitation to give the Hunterian Oration in 1840, which was published the same year as *Vital Dynamics*. His oration presents a revised methodology for comparative anatomy, which includes a detailed recommendation of Coleridge's philosophical work to the members of the Royal College. Green praises Coleridge for affirming the 'all important distinction of the Reason and Understanding', and thus for saving philosophy from Locke and Hartley's associationism.[39] He then proceeds to outline a new method that bears the hallmarks of Coleridge's philosophy of natural science. Natural science, Green states, is 'a scheme of Causes and Laws in the unity and with the connections of Reason', and, citing Coleridge's *On the Constitution of the Church and State*, he defines ideas as principles of speculative reason that form the subjective side of laws operating objectively in nature.[40]

In *Vital Dynamics*, Green builds on Coleridge's method to develop an alternative to John Herschel's account of induction as generalisation. Science must pursue an 'anticipatory' method, he proclaims, in which ideas direct our search for laws that determine the occurrence of effects according to their grounds.[41] These laws are not available to the understanding, which cuts and divines. They can be discovered only by the synthetic power of reason, which is able to grasp opposites in their unity. Coleridge had stated that the 'anatomist himself really seeks for an Idea – not to learn what this or that limb – Hand for instance – is but to learn what a Hand is' (*SW* II 1311). This is to say that the idea is antecedent to the inquiry, and drives the understanding to search for a law that transcends every particular instance. In Green's terms, 'the method of the sciences must be dynamic; that is, by contemplating nature as a scheme of causes and laws with the connections, and in the unity, of reason.'[42] The idea of life is a 'law' that grounds comparative anatomy in physiology, thereby drawing the diverse range of living beings into a natural system:

[39] Green, *Vital Dynamics*, xiv-xv.
[40] Green, *Vital Dynamics*, xxvii-xxviii.
[41] Green, *Vital Dynamics*, 11.
[42] Green, *Vital Dynamics*, 21.

> by comparing, I say, the various groups of the animal kingdom, we shall find that they may be ranged in an ascending scale, of which the degrees are marked by a relative balance and proportion of the vital forces, and in which the ascent is determined by the evolution of life into Sensibility, and by the subordination of sensibility as the highest force and most essential form of living existence.[43]

Building on his collaboration with Coleridge, Green develops a method in keeping with German anatomists such as Kielmeyer and Goethe, who identified classificatory categories according to the balance and proportion of the life forces.[44] After presenting his comparative method, Green lays out a series of transitions in anatomy from protozoa to insects, and from molluscs to vertebrates, in which each level is marked by increasing internal organisation. The ascent is unified by 'the opposition and harmony of two great tendencies; – on the one hand that of nature to integrate all into one comprehensive whole … and on the other hand, the tendency to integration in the parts.'[45] Here Green's analysis is undoubtedly Coleridgean. He examines 'the advancing perfection of nature towards Individuality', and claims that it reaches its highest degree of individuation in the human.[46] The insight that all living form participates in a dynamic system, Green explains, enabled the German anatomists to discover 'the pattern and pre-existing model, according to which, and the genetic process itself by which, organic forms are constructed.'[47] This pattern is not fixed mould, applied like a stamp to passive matter. It is rather but rather an 'inward type' manifest in every outward expression of organic life, grasped by reason's inward eye.[48] The upshot of Green's program of research is radical in the context of British bioscience. No longer is the purposiveness of organic form understood as the product of a divine idea as efficient cause. The idea of life is grasped through careful empirical examination of the form of activity under which the vast diversity of organic life can be classified. Once discovered, Green declares, this idea can show that the 'varied organic forms are but modifications of one simple primary form.'

William Whewell

Green's lectures offered a platform for Coleridge's theory of life some twenty years after Coleridge had first developed a systematic account of anatomy. In *Vital Dynamics*, he also praises the work of William Whewell, professor of minerology at Cambridge, who met regularly with Coleridge and Green at the BAAS during the early 1830s. Green saw that Whewell's historical and

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[43] Green, *Vital Dynamics*, 33.
[44] For example, see Kielmeyer, *Über die Verhältniße der organischen Kräfte*, 43-6, and Goethe, *Erster Entwurf einer allgemeinen Einleitung in die vergleichende Anatomie*, LA I 9: 121-5.
[45] Green, *Vital Dynamics*, 39.
[46] Green, *Vital Dynamics*, 42.
[47] Green, *Vital Dynamics*, 57.
[48] Green, *Vital Dynamics*, 38n.

philosophical examination of the inductive sciences offered a much-needed alternative to Herschel's inductivist methodology, for it demonstrates that 'the method of science must be dynamic; that is, by contemplating nature as a scheme of causes and laws with the connections, and in the unity, of reason.'[49]

Whewell too had a longstanding interest in German philosophy. In 1825, he visited Freiburg to study minerology under Friedrich Mohs, where he records an encounter with 'the metaphysical genius in Germany' that demonstrated to him that the 'relation of Causation is a condition under which we think of events.'[50] In *The Philosophy of the Inductive Sciences* (1840), Whewell explains that ideas connect 'impressions of sense according to relations of space, time, number, likeness, cause etc.'[51] These ideas are not Lockean imprints on a passive mind but cognitive activities that prescribe the 'laws' that objects necessarily follow. At the heart of the philosophy of science lies the 'antithesis of philosophy', a discordant energy between ideas and things, theories and facts, subject and object. The task of inductive science is to harmonise the two sides of the antithesis:

> As in man's contemplation of nature, there is always some act of thought which depends upon himself, and some matter of thought which is independent of him … the combination of these two elements, the subjective or ideal, and the objective or observed, is necessary, in order to give us any insight into the laws of nature.[52]

The antithetical nature of philosophy is particularly evident in what Whewell terms 'The Philosophy of Biology', which encompasses the sciences concerned with 'living things.'[53] Scientific theories for Whewell work toward clearer and clearer delineations of their subject matter, and the task of the philosopher is to define these delineations and show how they form the history of a science. The philosopher of biology recognises that the sciences concerned with living things have a distinct methodology and mode of explanation, based on 'a particular *Idea*.'

The structural similarities between Whewell's philosophy of biology and Coleridge's *Theory of Life* are striking. Like Coleridge, Whewell presents a survey of failed attempts to define the idea of life, including Bichat's definition that life is the system of functions by which death is resisted, and the attempt to list various living functions.[54] Each of these attempts, he explains, presuppose the idea it aims to determine, for they identify the defining marks of living nature through an exclusively empirical method. In the major discoveries in biology – the circulation of the blood, digestion,

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[49] Green, *Vital Dynamics*, 21.
[50] Whewell, *The Philosophy of the Inductive Science Founded Upon Their History* (hereafter, *Philosophy*), 172-3.
[51] Whewell, *Philosophy*, 25.
[52] Whewell, *Philosophy*, 30.
[53] Whewell, *Philosophy*, 543.
[54] Whewell, *Philosophy*, 574-575.

assimilation and generation – we can discern the basic principle of the *philosophy* of biology: 'Observation taught much; and among other things, she taught that there was something that could not be observed, but which must, if possible, be conceived.'[55]

Having identified the problems encountered by each of the main positions, Whewell proposes an alternative that draws from Kant's transcendental examination of judgments of organic structure in *Critique of the Power of Judgment*: *X* qualifies as a living being if *X* is judged under the idea of an 'organised product of nature … in which all the parts are mutually ends and means.'[56] The 'great metaphysician' was the first to see that the idea of life cannot be discovered in a particular science; it is rather the enabling condition of domain of inquiry concerned with living things. Whewell then attempts to show that Kant's definition 'is capable of being made the basis of sound knowledge' if the philosopher of biology provides sufficient determination to the 'Idea of an Organic or Living Being.'[57] A living being is one whose powers are such that it appropriates to itself new substances and makes them part of itself: '*Organic Life is a constant Form of a circulating Matter, in which the Matter and the Form determine each other by particular laws (that is, by Vital Forces)*.'[58]

Whewell's philosophy of biology stands in radical opposition to his contemporary physicotheologians, who studied the teleological structure of living beings as the product of an external idea. The idea of life cannot be posited as an external causality but must 'be supplied by the student of organization out of his own mind.'[59] This is not to imply that the organizing principle of biology is solely subjective. Echoing Green's comparative anatomy, Whewell rejects the notion of design in favour of 'type', understood as an inward pattern or idea grasped intuitively by speculative reason.[60] Type introduces an immanent kind of normativity to the examination of organic form. While the natural forces studied in physics and chemistry (gravity, elasticity and affinity) never act in a diseased manner, the forces studied in biology do not always act as they should. In Brunonian terms, organic forces can diminish or become overexcited, giving rise to diseased states. They 'have as their object to conform the living being to a certain type', and can fail for multiple reasons. Whewell concludes that while the biological sciences are still in their infancy, the groundwork has been accomplished. Once the study of living beings is based in 'natural relations' rather than mechanical abstractions, our knowledge of organic functions 'have tended more and more to the character of exact and rigorous science.'[61]

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[55] Whewell, *Philosophy*, 581.
[56] Whewell, *Philosophy*, 573.
[57] Whewell, *Philosophy*, 587.
[58] Whewell, *Philosophy*, 588.
[59] Whewell, *Philosophy*, 621.
[60] Whewell, *Philosophy*, 627.
[61] Whewell, *Philosophy*, 579.

Richard Owen

Green's Hunterian Oration was attended by Richard Owen, a young medical student who soon went on to become one of the most prominent anatomists and zoologists of the time. Owen also attended Green's lectures on comparative anatomy in 1826, where he noted that 'For the first time in England the comparative anatomy of the whole Animal Kingdom was described. … The vast array of facts was linked by reference to the underlying Unity, as it had been advocated and illustrated by Oken and Carus.'[62] Owen was mentored by Green during the 1820s, and the two surgeons remained on close terms over the following decades.[63] Owen edited Green's *Vital Dynamics*, and urged Green to include a methodological appendix on the use of type in comparison. He received the Hunterian lectureship in 1836, and was elected as president of the BAAS in 1856.

Owen was also mentored by Whewell, who entrusted his mentee with the task of reviewing the proofs of *Philosophy of the Inductive Sciences* in 1840.[64] Like Whewell, Owen adopted a broadly Coleridgean conception of ideas in the study of comparative anatomy.[65] This is particularly evident in the lectures he gave at the Royal College during the early 1840s, in which he presents a theory of the 'vertebrate type' and its relation to homology. Owen explains that the vertebrate type is discovered inductively by generalising from anatomical research, comparing a wide range of vertebrate skeletons to derive an idea, whose source lies in the divine mind. In 1849, Owen developed his type theory in a lecture at the Royal Institution entitled 'Discourse on Limbs.' The task of the anatomist, he explains, is to define the 'Bedeutung' of the limbs in vertebrate animals, 'that essentially which it retains under every modification of size and form, and for whatever office such modifications may adapt it.'[66] Owen uses the German term *Bedeutung* to refer to the 'archetype or primal pattern' that constitutes 'the basis supporting all the modifications of such part for specific powers and actions in all animals possessing it.'[67] Structural changes can be observed synchronically between existing varieties, and diachronically between fossilised remains. The archetype does not, however, provide a causal explanation. 'To what natural laws or secondary causes the orderly succession and progression of such organic phenomena may have been committed', he states 'we are as yet ignorant.'[68] Of what we can be sure is that nature 'has advanced with slow and stately steps, guided by the archetypal light amidst the wreck of worlds, from the first embodiment of the Vertebrate idea under its old Ichthyic vestment until it became arrayed in the glorious garb of the human form.'

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[62] Owen to John Simon, quoted in Green, *Spiritual Philosophy*, I xiv-iv.
[63] Green thanks Owen in several places in *Vital Dynamics*, and notes Owen's input in his decision to include an Appendix on transcendental anatomy.
[64] Sloan, 'Whewell's Philosophy of Discovery', 54.
[65] Desmond traces the influence of Coleridge's methodology on Owen's comparative anatomy in *The Politics of Evolution*, 254-260.
[66] Owen, *On the Nature of Limbs*, 2.
[67] Owen, *On the Nature of Limbs*, 2-3.
[68] Owen, *On the Nature of Limbs*, 86.

In his presidential address to the BAAS delivered in Leeds in 1858, Owen laid out the historical dimension of his project in a way that builds on the idealist methodology found in Green and Whewell and yet points to a causal explanation of morphological change. The appearance of higher forms of life, including reptiles, birds and mammals, must be explained by the 'axiom of the continuous operation of the Creative power, or of the ordained becoming of living things.'[69] Drawing on his extensive work cataloguing the geographical distribution of animals in the past, Owen proposed that the distribution of organic form ceases to correlate with what we find today the further back in time we go.[70] The reason for this difference, he claims, lies in major changes occurring in geological history, which altered the relative positions of land and sea. Changes in environmental conditions even account for extinction, as larger animals are unable to adapt to changing geological conditions. The result is a research programme in which the comparative anatomist, guided by the *Bedeutung* of organic form, can search for the mechanical causes responsible for the continuity, alteration and extinction of various species through the multi-generational processes of propagation, adaptation and the struggle for life.

6. Conclusion

Coleridge's *Theory of Life* forged a link between Hunter's lectures on the principles of surgery, Beddoes' application of Brunonian medicine to various diseases and the scientific approach to comparative anatomy developed in German medical departments. Similar connections can be discerned in the work of Green, Whewell and Owen, indicating the parallel development of a theory of ideas capable of uniting a new science of comparative anatomy under life considered as an idea. While it is impossible to define Coleridge's influence with precision, there is sufficient evidence to conclude that his ability to adopt, transform and apply the insights of German philosophers and medical professors to the leading scientific issues debated in London's intellectual circles impacted the consolidation of comparative anatomy in Britain.

By the end of the 1840s, several assumptions were in place that would have a deep impact on the development of the Coleridgean method in the decades leading up to Darwin's *On the Origin of the Species* (1859). The transcendental approach to comparative anatomy had become firmly established in the Royal Institution, the College of Surgeons, the BAAS and the Universities of London and Cambridge. Darwin read Whewell's *History of the Inductive Sciences* in 1838, and reviewed Owen's *On the Nature of the Limbs* and his 'Presidential Address' shortly after their respective publications.[71] When his work on comparative anatomy is read against the historical backdrop of comparative anatomy in the mid-nineteenth century, it is clear that Darwin developed his

[69] Owen, 'Address', li.
[70] Owen, 'On the Geographical Distribution of Mammalia', 179.
[71] Darwin refers to Owen 14 times in *On the Origin of the Species*. For references to the texts mentioned here, see 242 and 320.

account of morphological change within a British context that was far more conversant with European sources than is often recognised, with Coleridge providing a vital link in this cultural translation. Yet as Owen noted in *On the Nature of the Limbs*, no one had yet been able to establish the laws governing the macro-level structural change. While Owen entertained the hypothesis that a reptile had changed into a mammal, and an ape into a human, he acknowledged that such a hypothesis remained unsubstantiated. Darwin's principle of evolution by natural selection would provide a ground-breaking solution, explaining how environmental pressures act on variations within a species such that viable traits are selected over those that prove to be less conducive to survival.[72] Yet the broader methodological framework was already in place by which the comparative anatomist reflects on the staggering variety of living form as the product of a dynamic, self-constituting system in which the human mind is very much at home.

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[72] Richards, 'The Impact of German Romanticism on Biology in the Nineteenth Century', 125. See also Rupke, *Richard Owen*, ch. 5.

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