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Article

Accepted Version

Holmes, J. (2015) Pre-Raphaelitism, science and the arts in 'The Germ'. *Victorian Literature and Culture*, 43 (4). pp. 689-703. ISSN 1470-1553 doi:
<https://doi.org/10.1017/S1060150315000212> Available at
<http://centaur.reading.ac.uk/37467/>

It is advisable to refer to the publisher's version if you intend to cite from the work.

To link to this article DOI: <http://dx.doi.org/10.1017/S1060150315000212>

Publisher: Cambridge University Press

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Pre-Raphaelitism, Science and the Arts in *The Germ*

In her landmark study *The Art of the Pre-Raphaelites*, Elizabeth Prettejohn identifies “the burgeoning Victorian interest in the sciences” as one of Pre-Raphaelite art’s “most important contemporary contexts” (251). Many critics have seen the at times remorseless detail of early Pre-Raphaelite painting and poetry as analogous to science. As Tim Barringer puts it, “The attention which hard-edged Pre-Raphaelite naturalism of the 1850s paid to observing the individual object encapsulates [science’s] questioning, empirical spirit” (16). A major exhibition of Pre-Raphaelite landscape painting in London, Berlin and Madrid in 2004 to 2005 paid close attention to geology, meteorology and natural history (Staley et al.). There have been a growing number of studies of specific aspects of the relationship between Pre-Raphaelitism and science, with individual chapters or articles published on Pre-Raphaelitism and phrenology (Grilli), physiognomy (Hartley 80-109) and ethnography (Pointon), and on specific painters, including John Everett Millais (Codell) and John Brett (Payne 104-23). Through this work, recent critics have begun to rediscover the relationship between Pre-Raphaelitism and science which Victorian critics favourable to the movement saw as fundamental to it (see also Rosenfeld). Writing in the *Fortnightly Review* in 1867, Sidney Colvin remarked that “the scientific spirit, coupled with the disgust of earnest men at academic pretensions and their reaction from academic principles, constituted the very essence of præ-Raphaelitism” (470-71). In his lectures on *The Art of England*, given at Oxford in 1883, John Ruskin went still further, insisting that “the grotesque and wild forms of imagination” that characterised Pre-Raphaelite painting, far from being “the reaction of a desperate fancy, and a terrified faith, against the incisive scepticism of recent science,” were “a part of that science itself” (52). Three years later, giving an account of the formation of the Pre-Raphaelite Brotherhood in the *Contemporary Review*, Holman Hunt himself recalled that he and Dante Gabriel Rossetti had often discussed science and its relation to art:

We frequently talked over scientific and historical matters, for my previous reading and experience had led me to love them and to regard them as of the greatest poetic and pictorial importance for modern art; for then, as now, I concluded that the appeal we made could be strengthened by using the instruments of the age which human intellect had discovered. (“Pre-Raphaelite Brotherhood” 739)

By Hunt’s own account, he and Rossetti disagreed profoundly on this point, with Rossetti dismissive of science even as he himself looked to it to enrich modern art. Either way, Hunt’s recollections suggest that the place of science in relation to art was actively debated by the Pre-Raphaelites in the process of defining their own distinctive project.

This debate was conducted publicly in the pages of the short-lived Pre-Raphaelite periodical The Germ, which ran to four issues in the first few months of 1850 before folding for lack of sales. Although The Germ is an important point of reference for all Pre-Raphaelite scholarship, surprisingly little has been published on the magazine itself (for extensive discussions of The Germ, see Demoor; Spinozzi and Bizzotto; Stauffer; Werner 58-73). One article from the second issue, “The Purpose and Tendency of Early Italian Art,” by Frederic George Stephens, is routinely cited by critics looking to place Pre-Raphaelite art in relation to science (e.g. Barringer 15; Grilli 45; Merrill 172; Prettejohn 251; Staley et al 16, 30). Along with William Michael Rossetti, Stephens was one of the two original members of the P.R.B. who would go on to make his living as an art critic rather than a painter or sculptor. His article is only one of several across the magazine which hold science up as a possible model for the arts, whether directly or implicitly in the critical vocabulary which they employ. By reading these essays together, as they were first published, it is possible to see how thoroughly the Pre-Raphaelites theorised their artistic project in terms of a particular mid-Victorian ideal of science. At the same time, while most of the essays in The Germ support the position Hunt would later identify as his own, in opposition to Rossetti’s, the magazine also became a forum in which the question of how far the arts ought to take account of science could be debated without presuming on a foregone conclusion. In this debate the competing visions

of Pre-Raphaelitism represented in Hunt's later account by himself and Rossetti can be seen emerging at a very early stage in the movement's history.

Thoughts towards Nature: Science as a Model for Art

The Germ affirms a commitment to truth grounded in a scientific understanding of nature on its title page. Even the title itself is, in Stephanie Grilli's words, a "biological and botanical reference" (45). This title was short-lived, however, originating less than a fortnight before publication and lasting for only two issues before being replaced with the more neutral "Art and Poetry." A more consistent guide to the magazine and what it intended to offer was the subtitle, "Thoughts towards Nature," proposed by Dante Gabriel Rossetti as the title in September 1849 (Rossetti, P.R.B. Journal 15) and retained as the subtitle for all of the four issues printed. This phrase chimes with the object of The Germ's critical writings as set out in its endpaper, again drafted by Rossetti (Hunt, Pre-Raphaelitism 1: 135):

to encourage and enforce an entire adherence to the simplicity of nature; and also to direct attention, as an auxiliary medium, to the comparatively few works which Art has yet produced in this spirit.

Rossetti's insistence on "an entire adherence to the simplicity of nature" appears to align the Pre-Raphaelite project with the conception of nature articulated by John Herschel in A Preliminary Discourse on the Study of Natural Philosophy, first published in 1831. In his conclusion, Herschel affirms that:

It is only when we are wandering and lost in the mazes of particulars, or entangled in fruitless attempts to work our way downwards in the thorny paths of applications, to which our reasoning powers are incompetent, that nature appears complicated: — the moment we contemplate it as it is, and attain a position from which we can take a commanding view, though but of a small part of its plan, we never fail to recognise that sublime simplicity on which the mind rests satisfied that it has attained the truth.
(360-61)

Herschel's book was one of the defining statements of early Victorian philosophy of science.

Unlike William Whewell's more recent but considerably more forbidding books on the History and The Philosophy of the Inductive Sciences, Herschel's discourse was aimed at a general reader, someone who might buy The Cabinet Cyclopædia to which it belonged. It is not unlikely that Hunt for instance might have encountered it in the course of the autodidactic reading in his father's library which he later saw as foundational to his views on art ("Pre-Raphaelite Brotherhood" 739). Whether or not the Pre-Raphaelites knew his book directly, Herschel's conception of the "simplicity" of the "truth" of "nature" corresponds closely with their mental framework and vocabulary in The Germ.

For Herschel, science is both the instrument which reveals this simplicity and a record of it. In emphasising thought rather than observation or experiment, The Germ's subtitle "Thoughts towards Nature" may suggest an affiliation with the philosophical assumptions and methods of rational deduction or Romantic idealism. Yet the bulk of The Germ's critical prose leans decidedly towards empiricism and induction. In the first of what was to have been a series of essays "On the Mechanism of a Historical Picture" (Germ 70-73), Ford Madox Brown insists that the design of a picture needs to be "subordinate to the truth of nature" (73). In his monthly poetry reviews, The Germ's editor William Rossetti consistently judges poetry by the same standard. He is pleased to note that the "reflective" tendency of Matthew Arnold's thought "does not absorb the due observation or presentment of the outward facts of nature" in The Strayed Reveller and Other Poems (Germ 96), "absorb" here meaning "overwhelm." He rebukes the now-forgotten poet George John Cayley for the "conventionality" (Germ 143) of his dialogue and praises Robert Browning for his determination to represent "idiomatic conversational truth," resulting in "the most literal transcript of fact compatible with the ends of poetry and true feeling for Art" (Germ 191). The vocabulary of Rossetti's reviews gives a concrete sense of how what Brown calls "the truth of nature" is to be realised in the arts. The "adherence to the simplicity of nature" projected in the

endpaper requires the rejection of “conventionality.” It is to be achieved through the “observation” of “outward facts.” Once observed, these “facts” are to be “transcribed.”

The essay in which Rossetti sets out his aesthetic criteria most fully is his review of Arthur Hugh Clough’s The Bothie of Toper-na-fuosich (Germ 34-46), later retitled The Bothie of Tober-na-Vuolich after it became apparent that the title—“in English, ‘the hut of the bearded well,’ a somewhat singular title, to say the least,” as Rossetti remarks (36)—might have obscene implications. Rossetti is very impressed by Clough’s poem, not least for the “aspect of fact” (36, original emphasis) which he finds pervades it. According to his review, The Bothie exhibits both a remarkable “completeness” in its “descriptions of nature” (43) and a precise rendition in hexameter verse of “the technicalities of speech, of manners, and of persons of an Oxford reading party in the long vacation” (35). Clough therefore combines the attention to outward nature which Rossetti goes on to praise in Arnold with the precise record of idiomatic speech he finds in Browning. Only occasionally, Rossetti suggests, does he indulge himself in “mere poetry” for its own sake at the expense of “a strict observance of nature” (45). The pun is presumably unintended, but it is nonetheless apt that “observation” should become for Rossetti a form of “observance.”

Precisely the same vocabulary that Rossetti uses of poetry is used by Stephens of painting in “The Purpose and Tendency of Early Italian Art” (Germ 58-64). In its title, this essay announces itself as a manifesto for Pre-Raphaelitism, although initially only to a select audience, as the meaning of the mysterious letters P.R.B. with which Hunt, Millais, Dante Gabriel Rossetti and James Collinson had been signing their pictures was not revealed until it was exposed by the Illustrated London News in May 1850, three months after Stephens’s essay was published (Rossetti, P.R.B. Journal 233-34n). In a characteristic Pre-Raphaelite move, Stephens uses an essay on fourteenth- and fifteenth-century painting to announce a programme for a “modern school” of art. The objective of this “modern school” is to produce “pure transcripts and faithful studies from nature, instead of conventionalities and feeble reminiscences from the Old Masters” (58). For an artist to succeed in this undertaking, he needs to pursue a “longer and more devoted course of

observation” (58) than previous artists. His “firm attachment to truth” will be borne out by his “training himself to the deepest observation” of “fact and detail, enabling himself to reproduce, as far as possible, nature herself” (59). This recurrent and unambiguous emphasis on fact and observation in poetry and painting shows that for William Rossetti and Stephens, as for Hunt and Brown, the Pre-Raphaelite project was a firmly empirical one.

The analogy between art and the sciences is drawn most directly in this well-known paragraph from “The Purpose and Tendency of Early Italian Art”:

The sciences have become almost exact within the present century. Geology and chemistry are almost re-instituted. The first has been nearly created; the second expanded so widely that it now searches and measures the creation. And how has this been done but by bringing greater knowledge to bear upon a wider range of experiment; by being precise in the search after truth? If this adherence to fact, to experiment and not theory, — to begin at the beginning and not fly to the end, — has added so much to the knowledge of man in science; why may it not greatly assist the moral purposes of the Arts? It cannot be well to degrade a lesson by falsehood. Truth in every particular ought to be the aim of the artist. Admit no untruth: let the priest’s garment be clean. (61)

This passage is dense with clues as to the Pre-Raphaelites’ concept of “science.” The sciences for Stephens typify the precision and the “adherence to fact” that the Pre-Raphaelites demand of the artist. Their goal is “the search after truth,” resulting in “knowledge” that has become “almost exact” over the fifty years since 1800. They pursue this goal actively “by bringing greater knowledge to bear upon a wider range of experiment.” The same method, Stephens suggests, can bear fruit in the arts. In his review of The Bothie, Rossetti has mixed feelings about the “air of experiment” he finds in some passages where Clough allows himself metrical irregularities in his hexameters, though he accepts that there are several lines which “would be scarcely improved by greater exactness” (35). For Stephens, the example of the scientific experiment precisely authorises the artist to experiment in his own field. Closing a series of lectures at the Royal Institution in 1836,

the landscape painter John Constable had declared “Painting is a science, and should be pursued as an inquiry into the laws of nature.” “Why, then,” he had asked, “may not landscape painting be considered as a branch of natural philosophy, of which pictures are but the experiments?” (Leslie 355; see also Teukolsky 34) Stephens begins his essay by proposing that “historical painters” should follow the example of modern landscape painters in their “attention to nature in detail” (58). Like Constable, he invokes modern experimental science to license modern experimental art. As Marcia Werner observes, Pre-Raphaelitism “was at once grounded in the precedent of earlier art and linked to the spirit of experiment and discovery that characterized Victorian scientific Empiricism” (69).

The progress of science is for Stephens both a model and a justification for Pre-Raphaelite art, which aspires to be “an advance . . . nearer to truth in every object produced” (59) in its own right. The movement “towards Nature” through “Thoughts” projected by *The Germ* is both an individual and a collective ideal, both the artist’s (like the scientist’s) consistent object and the cumulative progress of the arts (and sciences) as a whole. The sculptor John Lucas Tupper, a close associate of the Pre-Raphaelite Brotherhood, fleshes out this analogy in the first part of his essay “The Subject in Art,” published in the first issue of The Germ (11-18; for Tupper, see Kapoor, “John L. Tupper, to 1863” and “John Lucas Tupper, 1865-79”; Landow; Pre-Raphaelite Friendship; Barnes and Kader). Tupper draws a serio-comic parallel between the ossification of earlier scientific ideas and the stagnation of taste in art. He begins by taking Euclidean geometry as an analogy for conventional aesthetic judgements. Critics judging a new work by the standards of an old one to determine whether it is “High Art” are like geometers comparing “two triangles in Euclid” (13):

the critics, certainly guilty of the most unpardonable blindness, blundered up to the masses of “High Art,” left by antiquity, saying, “there let us fix our observatory,” and here came out perspective glass, and callipers and compasses; and here they made squares and triangles, and circles, and ellipses, for, said they, “this is ‘High Art,’ and this hath certain proportions;” then in the logic of their hearts, they

continued, “all these proportions we know by admeasurement, whatsoever hath these is ‘High Art,’ whatsoever hath not, is ‘Low Art.’” (13-14)

“This was as certain,” Tupper sardonically remarks, “as the fact that the sun is a globe of glowing charcoal, because forsooth they both yield light and heat” (14).

Tupper’s purblind geometers are the equivalent of the Royal Academy, insisting that modern art should ape the pre-existing models of classical sculpture and Raphaelesque painting. This is no arbitrary analogy. One of the conventional rules of painting taught in the Academy which the Pre-Raphaelites repeatedly condemned was precisely the insistence on pyramidal groupings of figures (Rossetti, “Pre-Raphaelitism” 956; Stephens 3: 322; Tupper 4: 148; Hunt, Pre-Raphaelitism 1: 87), while in the *Art-Journal* later in 1850 the pioneer of photography and scientific populariser Robert Hunt took the Scottish painter and decorative artist David Ramsay Hay to task for insisting that art students should be taught what Hay called “the set formula, by which the human form may be bound within geometrical lines” as the key to beauty in figure painting (357). As a foil to such geometrical art critics and teachers, Tupper conjures up “a then embryon-electrician,” who would not have existed when the geometrical and artistic canons were being set down as he had been “withheld to bless and irradiate the physiology” of the Victorians’ own time. Had this prototype existed, Tupper suggests, he could have explained to the Academicians “that their ‘high art marbles possessed an electric influence, which, acting in the brain of the observer, would awake in him emotions of so exalted a character, that he forthwith, inevitably nodding at them, must utter the tremendous syllables “High Art”.” In so doing, he would “have done something more to the purpose than all the critics and the compasses” (14).

Tupper’s “embryon-electrician” may be a whimsical conceit, but he is not merely a comic character. Tupper’s language bears witness to his relative assessments of the geometers and the electrician. The geometers are pedants, prone to speak in out-dated English and with undue and legalistic precision, using “hath” for “has” and “admeasurement” where “measurement” would do. The electrician’s rhetoric is somewhat overblown in its own way, but his thinking is dynamic. Where they look for static analogies (“forsooth”), he identifies active causes (“forthwith”). While

Tupper may appear to mock the pretension of the phrase “High Art” itself, his essay as a whole is largely an attempt to define it, and this scientific parable is a key moment in that definition. For Tupper, different sciences have a different standing depending on how far they have kept pace with changes in knowledge and its practical applications. Tupper’s geometers stand for superseded science, not because their geometry is false in itself, but because they fail to realise that it no longer adequately accounts for the phenomena in question.

It was not until much later in the century that the non-Euclidean geometry pioneered on the continent by Nikolai Lobachevsky and János Bolyai made significant headway in Britain, and Tupper would not have had privileged access to these developments. But, as Alice Jenkins has shown (158-60, 172-74), the educational centrality of Euclid had been being debated and contested in Britain from the 1820s onwards. Tupper’s embryo-electrician embodies the move to displace Euclid with a more modern conception of science. According to Oxford English Dictionary, the science of electrophysiology had been named as recently as 1837 by William Leithead, the Secretary to the London Electrical Society, in his book Electricity: Its Nature, Operation, and Importance in the Phenomena of the Universe (275). Leithead mounts a robust defence of physiology as understood in terms of electrical impulses—a science which had grown rapidly since its origin in the famous but disputed work of Galvani in the late eighteenth century. Unlike other members of the close Pre-Raphaelite circle, Tupper had a scientific training. He studied anatomy, working as an anatomical illustrator at Guy’s Hospital in London. Through his training, Tupper would have known either Leithead’s book itself or the research it synthesised. He may well also have used Neil Arnott’s Elements of Physics, published in several editions from 1827 onwards. The title of Arnott’s popular textbook signals its ambition to supplant Euclid’s Elements, while its contents include an extensive account of anatomy, described largely in mechanical terms (see Jenkins 173-74). These books and others like them are mirrored in Tupper’s allegory of the history of art criticism.

Tupper's training as an anatomist and his development as an artist were intimately bound together. In his reminiscences of his student days, published later in the 1850s in the Crayon, Tupper casts himself as "anatomist in ordinary to Theseus," a famous Greek statue in the British Museum. Studying Greek sculpture, he recalls, led him to a deeper knowledge of anatomy, which in turn enabled him to realise more fully the vital power of art. "We were philosophers investigating nature," he writes, "We made discoveries in the Theseus; laid our hands on the awful shoulders, between the great collar-bones, and felt for the beating of his heart" (2: 400, original emphases). Brown advocates an equally close attention to and imaginative engagement with anatomy in his essay "On the Mechanism of a Historical Picture", arguing that the way for the painter to "enter into the character of each actor" in a scene is to study them "limb for limb, hand for hand, finger for finger, noting each inflection of joint, or tension of sinew" (71). As an anatomist and an art-student, Tupper searches for physiological signs of vitality in works of art. In "The Subject in Art," he suggests that modern physiology would attribute the quality of "High Art" to its "electric influence." Theseus and other marble statues which survive from antiquity exert such an influence, but the same or an equivalent influence can equally well be exerted by other art in other forms. As Stephens writes with reference to quattrocento painting, the modern artist should aspire to create the same effects as earlier art without imitating it directly. Tupper sums up his own argument at the beginning of the second instalment of his essay by declaring that "all objects so exciting mental activity and emotion in the highest degree, may afford subjects for High Art" (119). To deny this is to cling to an out-dated or at least increasingly irrelevant science; to embrace it is to open the door to new experiments in sculpture and painting.

Tupper sets a very modern science — electrophysiology — above an older one — geometry. The same emphasis on progress in knowledge and its applications leads Stephens to set chemistry above geology. In "The Purpose and Tendency of Early Italian Art" it is chemistry not geology which "searches and measures the creation." In a second essay, "Modern Giants," published in the fourth issue of The Germ (169-73), Stephens goes so far as to jibe at his readers, "You revel in

Geology: but in chemistry, the modern science, possessing thousands of powers as great as any used yet, you see no glory” (171). Where geology is a science which studies the past, chemistry is the science of the future. At the mid-century, when Stephens was writing, chemistry could and did celebrate itself as the paramount example of a modern science that had risen in fifty years from virtually nothing to the heights of both abstract and useful knowledge. In June 1848, shortly before the Pre-Raphaelite Brotherhood was formed, the physician Henry Holland reviewed new editions of two chemistry textbooks for the Quarterly Review. Surveying the advances in chemistry since the end of the eighteenth century, Holland impresses on his readers its modernity and the rapidity of its progress, remarking that those works in the subject that had “the greatest reputation” only thirty years ago “are now utterly out of date and useless” (38). Holland’s account of chemistry matches closely both the account of science more generally in Herschel’s Discourse and the conception of science that underwrites Pre-Raphaelite art theory in The Germ. All three see science as progressive, with chemistry singled out as the most remarkable example of this progress; all three insist, in Holland’s words, that “experiment and exact observation” are “the only road to physical truth” (39); and all three agree in characterising “truths” as “marked by their simplicity” (42; cf. Herschel 64, 76, 360-61).

The early Victorian ideals of science reflected in Herschel’s book and Holland’s article help to explain too what may seem at first an odd characterisation of science by Stephens as “adherence to fact, to experiment and not theory.” Richard Yeo and Jonathan Smith have each charted what Smith identifies as “the shift from Baconian induction,” which prioritised facts and experiments over theory, “to something like what we now call the hypothetico-deductive method” over the course of the nineteenth century (13). As Yeo notes, in 1831 Herschel affirms “the centrality of Bacon’s ideas to inquiries about the methodology of science” (267), putting his portrait on the frontispiece of his book and insisting on his primacy as the founder of natural philosophy as a discipline (cf. Herschel 104-5, 113-14). Herschel’s invocation of Bacon was not a naïve or wholehearted endorsement of his practice, while later Victorian philosophers of science went

further in qualifying and ultimately repudiating the inductive method. But as Yeo again points out, appeals to Bacon remained important to the rhetoric of science, being “most commonly associated with attacks upon hypotheses and theoretical conjecture, and with a celebration of factual observation” (285).

Such appeals to Bacon are characteristic of the two sciences singled out by Stephens well into the mid-century. Holland pays tribute to Bacon in his essay (39), while Charles Daubeny opens his textbook An Introduction to the Atomic Theory — first published in 1831 alongside Herschel’s Discourse and reissued in a revised edition in 1850, the year of The Germ — by declaring:

What indeed can be a greater triumph for the Baconian school of philosophy, than to find that the labours of a few microscopic chemists, of men whose ideas might be supposed to be in a manner limited to the narrow field which their researches embraced, have nevertheless done more towards the elucidation of one of the most abstruse questions on which the human mind can be engaged, than was effected by the profoundest intellects of the ages that preceded them, furnished with all the learning of the times in which they flourished, and inured to habits of abstract and subtle disquisition. (2-3; very marginally revised in the second edition, 3-4)

Daubeny was the Professor of Chemistry at Oxford throughout this period. He would later be instrumental in the campaign for the building of the Oxford University Museum, a project on which several of the Pre-Raphaelites themselves also worked, notably Tupper and Thomas Woolner. The same Baconian rhetoric recurs in a popular textbook by his future colleague, the Museum’s first keeper, the geologist John Phillips. Phillips’s Guide to Geology, first published in 1834, went through four editions over the next twenty years. Phillips’s account of the progress of geology remains constant as he insists that, “so long as men adhere to the method of philosophy taught by Bacon, geology can never again become a speculative science, never again be an arena for discussing delusive hypothesis and unsubstantial conjecture” (1st ed. 4; 4th ed. 5; Phillips revised his book very substantially in the next edition, published in 1864, in response to Darwin’s On the Origin of Species). For these men, as for other prominent scientists in their field—the geologist

Charles Lyell, for example, whose father was Dante Gabriel Rossetti's godfather—Baconianism was not just a powerful rhetorical device but also an identity. (James A. Secord draws out “Lyell's place in the vogue for ‘Baconian’ induction and empiricist theories of perception” (xxi) in his edition of Lyell's Principles of Geology.) Regardless of how far they followed it in their own practice, it tallied with their perceptions of that practice, particularly relative to what they took to be the freer, less well-supported theorisations of some of their French and German colleagues.

The Pre-Raphaelites voiced their own loyalty to Bacon on several occasions and in surprisingly forceful terms. Bacon is paired with Newton as the only natural philosophers to appear on Hunt and Rossetti's “list of Immortals” (Hunt, Pre-Raphaelitism 1: 159).¹ Smith (12) observes that by the beginning of the nineteenth century Bacon and Newton had been firmly canonised as the two heroes of the English scientific revolution. That they appear on the list of Immortals together and alone suggests that, rather than being inspired by individual scientists or scientific philosophers among their contemporaries, the Pre-Raphaelites were drawn more to the idea of science itself. Newton's notoriously misleading motto “Hypotheses non fingo” — “I make no hypotheses” — chimes with Stephens's emphasis on fact and experiment over theory. But it was Bacon, not Newton, that the Pre-Raphaelites really admired. On rereading Bacon's essays on his voyage back from Australia, Woolner, who went on to carve his statue at the Oxford Museum, wrote floridly “His mind is as pregnant with thought as a pomegranate is full of seeds and sheds truth as the sun does light” (Woolner 93). Hunt tellingly begins the second chapter of his memoir, where he begins his training at the Royal Academy and first meets Millais, with an epigraph from Bacon counselling his readers “to accept of nothing but examined and tried” (Pre-Raphaelitism 1: 18). For Stephens, Bacon was no less than “the greatest of all Englishmen” (4: 362). These endorsements all point to the Pre-Raphaelites identifying themselves as Baconians, perhaps holding Bacon himself up too as an ideal for his joint commitment to science and the arts. Smith observes that, increasingly, “‘Baconianism’ was seen as too sterile, too mechanical, and too impersonal to capture the artistic quality of the scientist doing science” (13). Yet for the most ambitious and imaginative artists of the

mid-Victorian period, Baconianism was precisely what was needed to inculcate a proper scientific attitude in the artist doing art.

Moral Purposes and Modern Life: Debating Science in Art

For the Pre-Raphaelites writing in The Germ, Baconian science sets an example to the arts in being progressive, experimental, and scrupulous in its commitment to truthful observation. But Stephens does not call for art to pursue knowledge directly as its end, as science does. Instead he suggests that the methods which science employs in “the search after truth” — experiment, precise attention to detail, factual accuracy, the application of knowledge — can advance the “moral purposes of the Arts.” At the same time, as science is the defining product and shaping force of the modern age, so art too should grapple with modernity. As Tupper puts it:

Art, to become a more powerful engine of civilization, assuming a practically humanizing tendency (the admitted function of Art), should be more directly conversant with the things, incidents, and influences which surround and constitute the living world of those whom Art proposes to improve. (Germ 122)

One of Rossetti’s reasons for admiring Clough’s Bothie, for example, was that evinced:

a peculiar modernness, a reference distinctly to the means and habits of society in these days, a recognition of every-day fact, and a willingness to believe it as capable of poetry as that which, but for having once been fact, would not now be tradition. (44)

In the fourth and last issue of The Germ, however, the emerging Pre-Raphaelite party-line that science should be the model for modern art was challenged in “A Dialogue on Art” (Germ 147-67) written by an obscure painter named John Orchard. Where Tupper was a member of the Pre-Raphaelite inner circle, Orchard was, according to William Rossetti, “quite unconnected with the P.R.B.” (“Introduction” 26). Aside from his contributions to The Germ, a few references in the P.R.B. Journal—the log of the Pre-Raphaelites’ artistic activity kept by William Rossetti—and the odd manuscript associated with his dealings with the Rossettis at this time, he has left no trace of his career as a painter, art theorist and poet.

Orchard was drawn to the Pre-Raphaelites by Dante Gabriel Rossetti's first exhibited painting, The Girlhood of Mary Virgin. In August 1849 he wrote a letter to Rossetti expressing his admiration for it (Rossetti, P.R.B. Journal 11). This introduction was fortuitous, as it came just as the Pre-Raphaelites, led in this by Rossetti, were planning their new magazine. In January 1850 Orchard sent Rossetti a poem for The Germ which was eventually published in the fourth issue (P.R.B. Journal 43). The first portion of "A Dialogue on Art" followed in February. Rossetti read it to Stephens and Tupper, and according to William Rossetti it was "highly admired" by all three of them (P.R.B. Journal 56-57). A continuation of this first dialogue arrived on 20 March (P.R.B. Journal 64), followed only six days later by the news that Orchard had died (P.R.B. Journal 66). Weighing up the prose essays in The Germ, Werner finds that, "With only minor variations, the authors in all four numbers present a consistent program" (59). Certainly there was much that the Pre-Raphaelites could agree with in Orchard's dialogue, in particular the conviction that "the modern artist seeks to use early medieval art, as a fulcrum" to raise his own art (Germ 160), ascending to "the art previous to Raffaele ... not so much for its forms as he does for its Thought and Nature" (167). On the other hand, the fact that the Rossettis, Stephens and Tupper all admired Orchard's "Dialogue on Art" as an accomplished piece of literature and a stimulating discussion of art theory does not necessarily mean that they agreed with his programme as a whole. As Werner notes, they "emphatically rejected" his didacticism (71), but there are also significant differences of opinion over the importance of science to the arts.

In one sense, Orchard's "A Dialogue on Art" exemplifies Rossetti's concept of "Thoughts towards Nature" equally as well as Stephens's "The Purpose and Tendency of Early Italian Art" or Tupper's "The Subject in Art." But it inflects that same phrase with very different meanings. Orchard's dialogue has four speakers, each representing a different priority in art. Kalon values beauty, Sophon wisdom and Kosmon nature. The fourth speaker, Christian, articulates a religious aesthetic which puts moral and spiritual purity first. Very early on in the dialogue, Kosmon declares the sciences and technology, "especially steam-power, chemistry and the electric telegraph," to be

“more — eminently more — useful to man, more radically civilizers” than the arts as they are usually understood (148). Kalon and Sophon draw distinctions between the arts and the sciences too, but theirs are in the arts’ favour. For Kalon, where the “fine arts are always grounded upon truth,” the “mechanical arts and science” are grounded merely “upon hypothesis” (148). For Sophon, by contrast, they are “merely simple facts; nothing more” (149). Either way, the sciences cannot advance mankind mentally or morally as the arts can. Kalon makes this case most compellingly, turning the terms, methods and even the efficacy of science against it. The sciences, he explains, are “limited, finite, material, can be uttered through formulas, worked by arithmetic, tabulated and seen in machines.” By the same token, the arts are “unconfined, infinite, immaterial, impossible of reduction into formulas, or of conversion into machines” (148-9). So although the “chemist, poet, engineer, or painter, alike, think,” “the chemist or engineer cogitates only the physical,” where “the poet or painter joins to the physical the human, and investigates soul” (149). In so doing, their art “takes in universal creation, its sights, sounds, aspects, and ideas,” becoming “something more than thoughts,” that is “Nature fully — thorough nature — the world of creation” (150). At this point Christian enters and the argument moves on from Kalon’s conclusion to the question of which elements of nature are fit for inclusion in art.

In Orchard’s “Dialogue,” the principles of Pre-Raphaelitism set out in The Germ are interrogated by an artist sympathetic to the Pre-Raphaelite project but not directly involved in it. As an admirer of Rossetti and a prospective contributor, Orchard read the first two issues of The Germ, which had been published by the time he was drafting his “Dialogue.” These issues included the first instalments of Tupper’s “The Subject in Art” and Brown’s “On the Mechanism of a Historical Picture,” Stephens’s “The Purpose and Tendency of Early Italian Art,” and William Rossetti’s reviews of Clough and Arnold. According to a surviving letter from Orchard to William Rossetti, the early portion of his “Dialogue” was “merely a transcription and condensation from notes of some two years’ standing” (Bodleian Library, MS Facs. d. 278, fol. 77). But although it was not originally composed as a direct response to the earlier essays on aesthetics in The Germ, it was

revised and submitted in the light of them, and Orchard's vocabulary — "truth," "Nature," "facts" — clearly brings it into dialogue with them. Orchard agrees with the key Pre-Raphaelite proposition that Nature is the proper subject of art and that art can embody truth, but he differs from the other writers in The Germ over the relationship of science to truth and Nature, and consequently to art. Indeed, he rejects the claim that art can or should learn from science at all. Where Stephens and William Rossetti insist that the artist must copy facts, Orchard suggests through Sophon that Baconian science's attention to fact is precisely its limitation. At the same time, through Kalon's scorn for "mere hypothesis," he suggests that science is not the way to truth in any more comprehensive sense, but only to suppositions. For Orchard, if truth to Nature is to be the ideal of art, it must be truth to a Nature that is recognised in and transformed by the intellectual and emotional qualities of humanity, lest art should become, in Christian's potent words, "mere natural history paintings from the animal side of man" (154).

Orchard challenges Stephens's claim that the "moral purposes of the Arts" can be best served by the imitation of science and Tupper's insistence that art needs to engage directly with the modern world—both positions that are reinforced by William Rossetti in his poetry reviews. Stephens's reaffirms both arguments in the face of Orchard's critique in "Modern Giants." It is not certain when Stephens wrote this essay, but as there are no references to it in the P.R.B. Journal, which William Rossetti neglected to keep between 8 April until 21 July, it seems likely that it was a late contribution to the fourth issue, published on 30 April. Its position in this issue, immediately after Orchard's dialogue and poem, invites readers to place them in dialogue with one another. Stephens's chosen pseudonym for this essay — Laura Savage, in praise of the savage — identifies him with Kosmon among Orchard's speakers, who argues that "men's souls are as much touchable and teachable through their animal feelings as ever they are through their mental aspirations", as "both Orpheus and Amphion knew when they, with their music, made towns to rise in savage woods by savage hands" (154-55). In affirming Kosmon's values, Stephens repudiates Orchard's. Like Kosmon, Stephens praises chemistry, as we have seen, and technology, warning that we are in

danger of missing “the poetry of the things about us; our railways, factories, mines, roaring cities, steam vessels, and the endless novelties and wonders produced every day” (170).

In Orchard’s “Dialogue,” Kosmon insists too that “Wisdom is not only shown in the soul, but also in the body,” arguing that “the bones, nerves, and muscles, are quite as wonderful in idea as is the incorporeal essence which rules them” (154). As in Tupper’s and Brown’s essays, anatomy for Kosmon is a means to grasp an “idea” as well as a mere material fact. For Christian, by contrast, the “rhetoric of the body” (164) is characteristic of Pagan, not Christian, art. Stephens takes up this analogy between art and anatomy, arguing on these very grounds for the moral power of art. In “Modern Giants,” he singles out Robert Browning, albeit not by name, as the “greatest, perhaps, of modern poets” (171). Browning’s greatness lies in the fact that he:

has looked into the heart of man, and shown you its pulsations, fears, self-doubts, hates, goodness, devotedness, and noble world-love; this is not done . . . in the dry operose quackery of professed doctors of psychology, mere chaff, not studied from nature, and therefore worthless, never felt, and therefore useless; but with the firm knowing hand of the anatomist, demonstrating and making clear to others, that the knowledge may be applied to purpose. (172)

Stephens distances Browning’s poetry from the “quackery of professed doctors of psychology.” In this, he may seem to be taking a line not unlike Kalon when he argues that it is the artist, not the scientist, who “investigates soul.” But Stephens does not replace the mind investigated by the “doctors of psychology” with the “soul” but rather with the “heart” and its “pulsations.” (For sophisticated discussions of the significance of these different terms in Victorian poetry, see Tate and Blair.) As Werner remarks, “Stephens’s anatomical metaphor associates Browning’s method with scientific objectivity and precision, and implies a kind of psychological empiricism” (66). In the study of emotion, he suggests, the artist is able to be more scientific than the supposed scientists themselves, precisely through his close attention to the body.

Stephens rejects the moral premise of Orchard’s essay, rammed home by Christian, that a godly art is a disembodied one. In “The Purpose and Tendency of Early Italian Art,” he grounds the

artist's religious mission precisely in "truth" in the scientific sense of scrupulous accuracy, boldly exhorting would-be artists "Admit no untruth: let the priest's garment be clean" (Germ 61). In "Modern Giants", he is again insistent on scientific accuracy in painting. It is ridiculous, he implies, for "the Public" to be "taught to look with delight ... upon rocks that make geologists wonder, their angles are so impossible, their fractures are so new" (172-73). The importance of such accuracy lies not so much in itself, however, as in what it testifies to. As he asks at the end of the essay, "Letting observation sleep, what can you know of nature?" (173) It is precisely by grounding itself in meticulous observation, informed and verified by modern science, and borne out by new, experimental approaches in painting and the other arts, that Pre-Raphaelite art can lay claim to moral authority — to a knowledge not only of physical but also of human "nature."

Conclusion

In The Germ, the Pre-Raphaelite arts are firmly rooted in a conception of scientific method. At its heart lies detailed observation, externally of the natural world and modern life, and internally of the range and quality of human mental states and their anatomical expression. As William Rossetti put it in the Spectator a year and a half after the collapse of The Germ, the Pre-Raphaelite artists insisted on "investigation for themselves on all points which have hitherto been settled by example or unproved precept, and unflinching avowal of the result of such investigation" ("Pre-Raphaelitism" 956). Rossetti incorporates Orchard's view of the artist as an investigator of the soul, but the way in which he characterises the process of investigation itself reaffirms science as the model for the arts. At the same time, the essays by Stephens, Tupper and Orchard show how actively the question of the relationship between art and science was debated among the first generation of Pre-Raphaelites. The Germ ran only to four short issues, yet in each of them this relationship was directly probed in at least one essay, while it shaped the critical vocabulary of the magazine as a whole. Many years later, Hunt implied that the difference of opinion on this question between himself and Rossetti had split the Pre-Raphaelite movement. To some extent it is possible

to read Stephens and Tupper, both initially friends of Hunt, as his proxies in The Germ, with Orchard as Rossetti's. Yet Orchard's "Dialogue" aside, there is a remarkable degree of consistency across the magazine. It is not only Stephens and Tupper who side with Hunt, but Brown and William Rossetti too, not to mention Dante Gabriel Rossetti himself, at least to the extent that he is willing to endorse an "adherence to the simplicity of nature" as the ideal for art. According to William Rossetti, his brother was the prime mover behind the project to launch The Germ in the first place, with the support of Hunt, Woolner and himself (Dante Gabriel Rossetti 1: 149-50). His sponsorship of Orchard notwithstanding, the broad consensus across the rest of the essays in The Germ suggests that Rossetti was more sympathetic to Hunt's position than Hunt himself later recalled.

On this basis, it seems that science was indeed, as Colvin remarked, the "essence" of Pre-Raphaelitism. But where other writers and artists — Tennyson, for example — responded to the discoveries of science, the Pre-Raphaelites were inspired rather by the idea of science itself. This Baconian ideal shaped their art in all its forms. It underwrote the practice of painting in the open air shared by Hunt, Millais and Brown, and led to the arduous exploration and intense scholarship typified above all in Hunt's The Finding of the Saviour in the Temple. In poetry, it manifested itself variously in incidental but detailed observation of nature in Woolner's "My Beautiful Lady" and Collinson's "The Child Jesus," in attention to the act of observation itself and an emerging ecological ethic in William Rossetti's "Fancies at Leisure," in more imaginative play with concepts such as ether and sound waves in Dante Gabriel Rossetti's "The Blessed Damozel" and "The Carillon," and in a gleeful tumble of jokes at the expense of contemporary astronomers, anatomists and evolutionists for their scientific inadequacies in Tupper's "An Incident in the Siege of Troy" — to mention only poems published in The Germ itself. Its culminating expression came in the design and decoration of the Oxford Museum, as Pre-Raphaelite artists worked hand in glove with scientists to realise a scientific vision of the natural world in stone and iron. The Germ may have

failed commercially, but its formulation of a theory of art modelled on science bore rich fruit across the arts throughout the 1850s.

John Holmes, University of Reading

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¹ The only other “Immortal” with a close connection to science on the list is Goethe. The list as printed has no defined order, but assuming it bears any relation to the order in which Hunt and Rossetti jotted down the names themselves, Goethe heads a series of Romantic heroes including the

Polish patriot Kosciusko and the poets Byron, Wordsworth, Keats and Shelley. Rossetti was an enthusiast for Faust (Willoughby), while there is little evidence that the Pre-Raphaelites engaged with Goethe's work on botany or optics at this stage, although Hunt certainly did make use of Goethe's Theory of Colours later in his career when researching pigments (Jacobi 119). If the Pre-Raphaelites were acquainted with Goethe as a scientist, they may well have recognised aspects of their own conception of science in his search for unity in nature and his emphasis on his version of science as described by David Knight: "personal knowledge, not gained at second hand but based upon flashes of insight or disclosures, and tested by its comprehensiveness, unity and truth to evidence" (17). While this Romantic model of science does suggest another construction which can be put on Rossetti's phrase "Thoughts towards Nature," unlike Baconian induction it does not prioritise observation, which was central to the Pre-Raphaelite project.