THE SCIENCE OF A SACRAMENT

Throughout the nineteenth century the physical sciences pursued a retreating and increasingly defensive religious orthodoxy. Their ineluctable advance can be gauged by comparing the attitudes toward science of Hopkins and his great mentor, John Henry Newman. When Newman lectured on "Christianity and Physical Science" in 1855, he could take refuge in the belief that "Theology and Physics cannot touch each other, have no intercommunion, have no ground of difference or agreement, of jealousy or sympathy."[1] For him, this absolute division between the physical and the metaphysical held good even in the sacrament purported to alter the status of matter, the transubstantiation of the eucharist; he quotes with approval Macauley's assertion that "No progress that science has made or will make" can add anything to an argument for or against the doctrine of transubstantiation. But by the time Hopkins wrote the poems of his maturity, it had become more difficult to keep theology and the physical sciences apart, especially with respect to the eucharist. Not only the publication of *The Origin of Species* (1859) but also new work in physics forced a reconsideration of theological assumptions about matter. With regret, the poet came to realize that Newman could not remain his model in all things. By 1873, though he still calls Newman "our greatest living master of style," he has begun to detect "a want, I think a real want, of brilliancy."[2] Hopkins felt compelled to risk what Newman would not, to span the ellipsis in Newman's thought and make the Blessed Sacrament understandable in physical scientific terms. Materialistic Victorians found transubstantiation extraordinarily difficult to credit. To gain their credence it was necessary not to deny the elusive connection between theology and science, between physics and metaphysics, but rather to find the proper words with which to identify it.

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[1] *The Idea of a University*, ed. Martin J. Svaglic (San Francisco: Rinehart, 1960), p. 326.

[2] *Letters* III, p. 58. Cited hereafter in text as "*L*, III."

Though less theologically learned than Newman, Hopkins was more philologically sophisticated. Out of his language studies he formulated new ways to articulate doctrine; he concentrated the complex issue of religion versus science into a verbal issue. Deeply interested in specialized vocabularies, he collected terms like "blazon" and "cinquefoil" from heraldry, fabricated numerous prosodic terms, and carefully studied local dialects and professional jargons. He demanded affinity of idea wherever he found coincidence of vocabulary. Sciences and sacraments met on the common ground of language, through the coincident use of the same or closely similar words in their separate lexicons. With as much audacity as skill, Hopkins attempted to develop from these tangential points of contact an outline of the overall relationship between the different universes of discourse. Through the carefully controlled ambiguity of key words like "charge" and "scape," he emblemized the encounter between whole systems of thought. The present essay examines Hopkins' dealings with physics and biology, and shows their consequences for his poetic diction.

Hopkins wished to connect the eucharist with the sciences because he hoped that such a connection would not only illuminate the eucharist, but "explain" the sciences as well. The new Victorian sciences raised more problems than they solved; for Hopkins the best way to confront them was to translate the language of theology into the language of science. Solutions were already latent in theology; the problem was to make them available to the scientist. We can see Hopkins defining the problems in "The Sea and the Skylark":

> We, life's pride and cared-for crown,
> Have lost that cheer and charm of earth's past prime:
> Our make and making break, are breaking, down
> To man's last dust, drain fast towards man's first slime.

The poem reflects a peculiarly Victorian dilemma spawned by the implications of change. Looking back on that dilemma from the beginning of the Modernist era, Alfred North Whitehead located its sources in two fields of science: "The . . . pair of new ideas to be ascribed to this epoch are both

of them connected with the notion of transition or change. They are the doctrine of the conservation of energy, and the doctrine of evolution." Together they "transformed the middle of the century into an orgy of scientific triumph."[3] Just after the middle of the century, Hopkins began thinking about the notion of change in the doctrine of transubstantiation; and he began thinking of how that notion was related to the transforming processes science called evolution and entropy.

Victorian science suggested that life was merely a chance configuration of elements, an intermediate step in the transformation of "first slime" into "last dust." It provided evidence that the natural state of things, from which life came and to which it returns, is inanimate. And as Jerome Buckley has pointed out, the new formulations of planetary physics were even more threatening than the better publicized claims of biology. "Despite technicalities beyond the grasp of most men of letters, the new astrophysics deeply stirred the literary imagination of the late nineteenth century. As early as 1852 William Thomson had helped formulate the second law of thermodynamics, according to which the sum of useful energy throughout the universe would be constantly reduced by the diffusion of heat until all had reached a state of entropy. 'Within a finite period of time past,' he had concluded, 'the earth must have been, and within a finite period to come, the earth must again be, unfit for the habitation of man.'"[4] Since all useful forms of energy would eventually be converted to heat, physics predicted the gradual deceleration of the cosmos to a dead stop. That process darkens Hopkins' apocalyptic skies in "Spelt from Sibyl's Leaves":

> Evening strains to be tíme's vást, ' womb-of-all, home-of-all,
> hearse-of-all night. . . .

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[3] *Science and the Modern World* (New York: Free Press, 1967), pp. 100-101.

[4] *The Triumph of Time* (Cambridge: Harvard Univ. Press, 1966), p. 67.

Our evening is over us; our night ' whelms, whelms,
and will end us.

Hopkins' calling the dying light "Waste" responds to the physicists' prediction of doom, given its most popular expression in Balfour Stewert's *The Conservation of Energy*: "Universally diffused heat forms what may be called the great waste-heap of the universe, and this growing larger year by year. . . . We are led to look to an end in which the whole universe will be one equally heated inert mass, from which everything like life or motion or beauty will have utterly gone away."[5]

Such sedation of the universe would not, of course, be sudden, but would be observable in the motion of the earth itself, as William Grove wrote: "One of the most startling suggestions as to the consequences resulting from the dynamical theory of heat is that made by Mayer, that by the loss of *vis viva* occasioned by the friction of the tidal waves, as well as their forming, as it were, a drag on the earth's rotary movement, the velocity of the earth's rotation must be gradually diminishing, and that thus, unless some undiscovered compensatory action exist, this rotation must ultimately cease, and changes hardly calculable take place in the solar system."[6]

Hopkins did not have to read books even as popular as Stewert's or Hermann von Helmholtz's *The Correlation and Conservation of Forces* for the concept of entropy to have affected his thinking.[7] His Oxford tutor, Walter Pater, was at the time of Hopkins' matriculation gestating what became the "Winkelmann" essay in *The Renaissance*. He wrote of what he called "the laws of natural necessity" which were "a magic web woven through and through us, like the magnetic system

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[5]Quoted in Buckley, p. 67.

[6]"Force and Energy in an Industrial Society," in *Victorian Science*, Basalla, et al., eds. (New York: Anchor, 1970), p. 92.

[7]See Todd K. Bender, *Gerard Manley Hopkins* (Baltimore: Johns Hopkins, 1966), pp. 60-70, on Hopkins and von Helmholtz.

of which modern science speaks, penetrating us like a network, subtler than our subtlest nerves, yet bearing in it the central forces of the world. . . . This network of law becomes the tragic situation." But with Pater the findings of science become merely personal metaphor; he used them to make aesthetic prescriptions for ills which actually had little to do with science. For example, in chapter xxii of *Marius the Epicurean* he writes: "Chastity—as he seemed to understand—the chastity of men and women, amid all the conditions, and with the results, proper to such chastity, is the most beautiful thing in the world and the truest conservation of that creative energy by which men and women are first brought into it." Pater uses the language of thermodynamics only to say something about the virtue of self-containment. Reducing the issue from a cosmic to a personal scale, physics yields to psychology.

Hopkins would have rejected such a reduction. To the young poet Pater's way was an invitation to an ornately decorated *cul de sac*, a richly colored solipsism whose walls were covered with the Italian Renaissance, but were no less claustrophobic for all the vividness with which they leaned inward. His poems extrapolate rather quickly from the human to the cosmic, and he would have found more instructive the Epicurean who was in a sense Pater's own tutor: Lucretius. We know from Hopkins' diary that he was taking notes on *De Rerum Natura* in 1864.[8] Lucretius believed that the universe, like the organisms which inhabit it, has a self-contained life cycle. His assertion that "since the mighty mass of earth, and water, and the light breezes of the air, and burning heat of fire—the elements of which the whole world is composed—are made of bodies which themselves are born and die, the same must be believed of the whole universe" came to be echoed in Hopkins' lifetime by scientists like Thomson. The quality of the earth's death is described at the conclusion of Book II of *De Rerum Natura*. "Since the world's first

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[8] *Journals*, p. 44. Cited hereafter in text as "J." *De Rerum Natura* will be quoted from the translation by James. H. Matinband (New York: Frederick Unger, 1965).

birthday" it accumulated energy until reaching its peak. Then decay began and energy scattered: "And even heaven's mighty walls shall be besieged, and they too shall collapse and fall in utter ruin. Even today the earth's power is being broken, and now she can hardly produce the tiniest creatures, who once made all the generations of huge beasts . . . . The gloomy grower of the old and withered vines sadly curses the times he lives in, and wearies heaven, not realizing that all is gradually decaying, nearing the end, worn out by the long span of years." Hopkins' "womb-of-all, home-of-all, hearse-of-all night" expresses Lucretius' certainty: "for we can have no doubt that the universal Mother is the tomb of all." These similar metaphors operate within a shared structure of ideas newly endorsed by Victorian physics. William Thomson claimed that the kinetic theory of gases, "the greatest achievement yet made in the molecular theory of the properties of matter," had been "shadowed forth by Lucretius."[9] That Lucretius' predictions were being confirmed by empirical investigation led Tennyson to write:

> —and that hour perhaps
> Is not so far when momentary man
> Shall seem no more a something to himself,
> But he, his hopes and hates, his homes and fanes,
> And even his bones long laid within the grave,
> The very sides of the grave itself shall pass,
> Vanishing, atom and void, atom and void,
> Into the unseen for ever,—
>
> ("Lucretius")

Hopkins' poems suggest a strategy for short-circuiting the universal doomsday-device. If the closed system of the world is tending toward a condition in which there will be no available energy, by what means can energy not only be conserved but increased? How are we to locate Grove's "undiscovered compensatory action?"

A number of the undergraduate poems deal with entropic conditions, usually on a cosmic scale. The young poet is

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[9]"The Structure of Matter and the Unity of Science," in *Victorian Science*, p. 108.

particularly fascinated by astronomical dislocations, the moon often serving as his example:

> The bugle moon by daylight floats
>
> So glassy white about the sky
> So like a berg of hyaline,
> And pencilled blue so daintily,
>
> I never saw her so divine.

A true child of the nineteenth century, Hopkins' lunar images are astrophysical rather than mythological. His out-of-place daylight moon floats aimlessly about the sky as if to indicate a universe quietly askew, a disturbance of cosmic order, a running down of the clockworks. The "Fragment of Anything You Like" goes farther:

> The lorn Moon, pale with piteous dismay,
> Who rising late had miss'd her painful way
> In wandering until broad light of day;
>
> Then was discover'd in the pathless sky
> White-faced, as one in sad assay to fly
> Who asks not life but only place to die.

The moon is forlorn because, like the woman for whom she is a simile, and like the "slip of comet" in fragment #103, she "stood before a light not hers," shining only with reflected radiance. This phenomenon is saddening for the reason Tennyson gave in "Locksley Hall Sixty Years After." The fate of "yon dead world the moon" predicts that of our own world:

> Dead the new astronomy calls her . . .
>
> Dead, but how her living glory lights the hall,
> the dune, the grass!
> Yet the moonlight is the sunlight, and the sun
> himself will pass.

Like Hopkins' slip of comet, they will all go "out into the cavernous dark." They can only "draw heat from this contagious sun" and cannot supply it from themselves. If that source itself should fail, entropy is inevitable. Within a closed system, such as the universe, the amount of available energy is always diminishing. The problem is to find an outside source, something transcending the closed system yet

capable of affecting it, capable of making its presence felt within the immanent, physical world. A poem entitled "Summa" assures us that there is something that keeps the world from running down:

> Man is most low, God is most high.
> As sure as heaven it is
> There must be something to supply
> All insufficiencies . . .

Hopkins' undergraduate poems, nearly all written before his conversion, are dominated by the search for that something. After his conversion he seems to have found it in the gift called grace, for later as priest he uses the gain or loss of heat energy to describe the action of grace on the soul:

> Spiritual tepidity then is not the being between hot and cold, for in that state every soul must be that has neither perfect charity nor mortal sin, taking those terms or limits to be what the metaphor means by heat, that is / the boiling point of heat, and by cold or the freezing point: but it is the passage downwards only from hotter to colder, it is to be cooling or to have cooled. And since the water must always be getting hotter, never cooler, while the pot is on the fire, it is implied, to keep up the figure, that the pot has been taken off, that is to say/that the soul is no longer acted on by grace but is left to nature.[10]

The action of grace compensates for a spiritual condition resembling the diffusion of heat energy. God's grace is analogous to the fire; without it the soul, and the universe, cool. Grace puts new energy into the system and keeps it going. We must remember, too, that Hopkins chose to perform this exegesis of thermodynamics upon a figure used in the third chapter of *Apocalypse*, vv. 15-16: "I know of thy doings, and find thee neither cold nor hot; cold or hot, I would thou wert one or the other. Being what thou art, lukewarm, neither cold nor hot, thou wilt make me vomit thee out of my mouth." Hopkins seizes upon the apocalyptic text, reads it rather strictly in terms of thermal physics, and

[10] *Sermons*, pp. 207-8. Cited hereafter in text as "*S*."

uses it to assert that God will continue to supply all insufficiencies. Eagerly he asserts that God's energy is continually manifest: "His providence is active . . . [and] will not run short in our lifetime" (*S*, 194). God did not wind up the universe like a big clock, and then leave it to run down: "God gave things a forward and perpetual motion" (*S*, 198-9).

Approaching conversion, Hopkins wrote that "The great aid to belief and object to belief is the doctrine of the Real Presence in the Blessed Sacrament of the Altar" (*L*, III, 17). That doctrine involves another; for Christ to be really present, the elements of the eucharist, the bread and wine, must be transubstantiated. The language with which Hopkins describes the Incarnation and the Blessed Sacrament suggests that he sensed in them a theological counter to the predictions of the new astrophysics; the transformation of bread and wine into body and blood provided a model for change that served as an alternative to the physicist's model of thermodynamic decline. In transubstantiation there was change from a lower to a higher state of charge instead of the reverse; therein lay the action of grace. For example, "The Wreck of the Deutschland" turns upon locating the precise relationship among the various operative meanings of the words "discharge" and "stress." The central stanzas of Part I consistently manipulate the language of physics to define the nature of the Incarnation. That is, the Incarnation exerts "the stress felt"; to become Incarnate is to introduce energy into the world, and through Christ's "dense and driven Passion" that energy undergoes "discharge." Hopkins has three meanings clearly in mind for that word: 1) Christ's discharge of his responsibility for saving mankind, 2) the discharge or flow of blood and water from his wound, and 3) the discharge of static electricity, as in "Thou art lightning and love" and the storm's "electrical horror." The last two meanings are my main concern, for through them Hopkins elides the sacrament of eucharist and the science of physics. The mixture of water and wine is reenacted in the chalice during mass. As Christ's agent, the priest reenacts the sacrifice of the cross and its exertion of "the stress felt."

The discharge's "swelling to be" is "in high flood yet" because Incarnation's discharge is rehearsed every day in the transubstantiation of bread and wine. The Incarnation brings energy from outside into the closed entropic system we call the universe. Like a battery or a lightning bolt, it discharges *into* something; it is discharged so that something else may become more highly charged. It is as if, through eucharist, fresh little packets of energy erupted every day, daily converting transcendent potentiality into kinetic immanence, as in a later poem, "The world is charged with the grandeur of God."

Sprung rhythm, an attempt to charge each line with maximum stress, is a corollary to this concept of energy. For Hopkins, "stress" means the supporting pressure of divine animation as well as metrical emphasis. His language resists not only the physicists' fear of entropy but also the rhythmic infirmity he found in the enervating, sing-song, "My Darling Clementine" rhythm of "Locksley Hall":

> O my cousin, shallow-hearted! O my Amy, mine no more!
> O the dreary, dreary moorland! O the barren, barren shore!

As a youth he wrote to Baillie, "Do you know, a horrible thing has happened to me. I have begun to *doubt* Tennyson" (L, III, 215). Doubting Tennyson and, after the "Ad Mariam" experiment, abandoning Swinburne's metrics, Hopkins found the meter proper to imitate in words the energy of the Incarnate Word.

* * *

To say the world is charged with the grandeur of God is to speak of the Deity as a physical property, as a condition of matter. When Hopkins claims that "flesh" is "the name for a condition of matter" (*S*, 171) he implies that the Word made flesh may be at least partially understood as a collection of physical properties. These properties come under the heading of "species." We usually understand that word as Darwin uses it in *The Origin of Species*, a class or variety

of organisms. But in the working vocabulary of a priest another meaning dominates: the outward form or appearance of bread and wine, the transubstantiated elements of the Eucharist. These two meanings of "species" meet in Hopkins' idea of "inscape." Christopher Devlin explains the relation of inscape to the numerous meanings of species: "*inscape* is here identified with beauty. Early (cf. p. 293), it was identified with nature or essence. The two are the same in an exemplarist context. The beauty (*species*) and the specific essence (*species*) of a creature both derive from its being a likeness (*species*) of some aspect of the Divine Essence" (*S*, 309). But Hopkins also recognizes the more strictly biological sense, for example when he maintains that "each poet is like a species in nature and cannot recur" (*S*, 278). In a note on the way animals survive after death, he explains that they do not have individual souls, but live on as a species. Father Devlin explains thus: "It is a medieval rather than a scholastic conception. It fuses three meanings of *species* into one: *species*, likeness; *species*, beauty; *species*, the subdivision of *genus*. The origin and division of species lie in this, that each reflects some aspect of the Creator's power and perfection" (*S*, 285).

Such a fusion gives rise to an important sector of Hopkins' vocabulary, the words identifying structure with category (as in Henry Purcell's uttering of "the very make and species of man"). The way Hopkins fuses these meanings allows him to make peace with the evolutionary hypothesis, allows him to explain it in a way which takes Providence into account. In his commentary on the Spiritual Exercises he gives an elaborate theological reading of evolution (*S*, 197-200). In pointing to "the wicked and the lost [who] are like halfcreations and have but a halfbeing," he makes them inchoate biological mutations, things without category because defective in structure. His characteristic placement of the damned low on the evolutionary scale reminds one of Holman Hunt's projected *Last Judgement*, where devils were to resemble extinct reptiles. Hopkins gives a strictly anatomical reason why snakes and dragons symbolize evil; they improperly combine discrete qualities. They do not harmonize but in-

stead create dissonance among the various meanings of species, grotesquely reflecting more aspects of the Creator than they can properly encompass: "Now among the vertebrates the reptiles go near to combine the qualities of the other classes in themselves and are, I think, taken by the Evolutionists as nearest the original vertebrate stem and as the point of departure for the rest. In this way clearly dragons are represented as gathering up the attributes of many creatures. . . . The dragon then symbolizes one who . . . ends up by being a monster, a 'fright'" (*S*, 199). The damned are like reptiles because they have no fit species, monsters whose members do not fit together. They are throwbacks giving evidence of their emergence from the slime of lower, less differentiated species.

It is not simply the embarrassment of doubtful parentage that makes evolution disturbing. Of course a man of Hopkins' sensibilities would be displeased to see "life's pride and cared-for crown" made available to Gilbert and Sullivan parody through the evolutionary hypothesis:

> Darwinian man, though well behaved,
> At best is only a monkey's shade.
>
> (*Princess Ida*)

But there was worse. The new element in Darwin's theory was the idea of "natural selection." Darwin saw chance mutation feeding a blind mechanism; in the development of species he left no room for a purposing mind. The mutant, the "monster," was biologically justified as the mechanism of all change. One way to oppose such materialism is to undermine or alter the notion of matter upon which it is based. Hopkins insisted that the Word made Flesh is a "condition of matter." The principle is formulated in a crucial passage of Scotus: "I say then, but without insisting on it, that before the Incarnation and 'before Abraham was,' in the beginning of the world, Christ could have had a true temporal existence in a sacramental manner. And if this is true, it follows that before the conception and formation of the Body of Christ from the most pure blood of the Glorious Virgin, then there could

have been the eucharist" (*S*, 113-114). Scotus suggests that since the Son is coeternal, the transubstantiation of bread and wine could have taken place before the Last Supper, or even before Jesus was born. The text not only implies that Christ redeems the Fall before it actually occurs, but also makes Christ a physical property, something inherent in matter which can be extracted at any time if one has the right formula ("This is my body"), regardless of the events in the life of Jesus.

If Christ is "there," intrinsic in matter from the Creation onward, then the evolution of life embodies the working-out of the inherent Christ-ness of things—the eucharistic species precede the biological species and generate their structure. Even chance mutation is part of the design when viewed this way: "Chance . . . is the stress of the intrinsic possibility things have" (*S*, 123). As a physical law, a principle of probability, Christ's stress informs matter and directs mechanism, making the chance operations of nature purposeful: "All the world is full of inscape and chance left free to act falls into an order and a purpose" (*J*, 230). Hopkins gives evolution a eucharistic teleology.

In such a manner Hopkins made words like "species" and "discharge" vehicles of a theological as well as a scientific tenor. Often his personal, coined vocabulary of instress, inscape, sake, etc., performed a similar synthesis. By these means he sought new credibility for transubstantiation. Working toward an explanation of the Blessed Sacrament both intelligible to Victorians suspicious of Catholic "superstition," and capable of calming their fears about origins and ends, he experimented with the raw materials of language. Ultimately he formulated a mode of speech managing transformation in science and sacrament with equal felicity, a language with a versatile but homogenous vocabulary. With such a language at his disposal, he could dispense with the elegant evasions of Newman. For Hopkins, metaphysical doctrine and physical science are reconciled through philology.

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CREDITS

All quotations from Hopkins' works, unless otherwise indicated, are taken from the following editions, reprinted by arrangement with the Society of Jesus:

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