

# THE MYSTERY OF EVIL.

BY PAUL R. HEYL.

## XVII. ATHEISM AT ITS BEST.

“If in this life only,” says St. Paul, “we have hope in Christ we are of all men most miserable.”

There was once a man whose life ran counter to this text at every point; yet he certainly did not consider himself to be pitied, and was of all men most cheerful. The lesson of his life is a lesson of fidelity to one's convictions, the bitter along with the sweet; it is a lesson of unconquerable courage and good cheer.

William Kingdon Clifford was a graduate of Trinity College, Cambridge, and was regarded as one of the most brilliant mathematicians of his day. He died in 1879, at the age of thirty-four. The last two or three years of his life were years of physical weakness and a general collapse of his whole system. When a youth, Clifford was an ardent High Churchman, but passed through his season of doubt as so many of us do. Charles Kingsley, when a young man, had the same experience, and came out of it more orthodox than ever; but alas! for poor, affectionate Clifford! He emerged stripped of every vestige of his former faith. No God to love and lean upon in time of trouble; none but creatures of clay to love him in return. A passage in one of his essays gives us a glimpse of the utter melancholy into which he was for a time thrown. Speaking of theistic faith, he says:

“We have parted from it since with such searching trouble as only cradle-faiths can cause. We have seen the spring sun shine out of an empty heaven to light up a soulless earth; we have felt with utter loneliness that the Great Companion is dead. Our children, it may be hoped, will know that sorrow only by the reflex light of a wondering compassion.”<sup>20</sup>

And then the courage and good cheer of the man reasserted themselves. Listen to him again:

<sup>20</sup> Clifford, “The Influence upon Morality of a Decline in Religious Belief”: *Lectures and Essays*, Vol. II, p. 247.

"It is a very serious thing to consider that not only the earth itself and all that beautiful face of nature we see, but also the living things upon it, and all the consciousness of man, and the ideas of society which have grown up upon its surface must come to an end. We who hold that belief must just face the fact and make the best of it; and I think we are helped in this by the words of that Jew philosopher, who was himself a worthy crown to the splendid achievements of his race in the cause of progress during the Middle Ages, Benedict Spinoza. He said: 'The free man thinks of nothing so little as of death, and his wisdom is a meditation not of death but of life.' Our interest lies with so much of the past as may serve to guide our actions in the present, and to intensify our pious allegiance to the fathers who have gone before us and the brethren who are with us; and our interest lies with so much of the future as we may hope will be appreciably affected by our good actions now. Beyond that, as it seems to me, we do not know, and we ought not to care. Do I seem to say: 'Let us eat and drink, for to-morrow we die?' Far from it; on the contrary I say: 'Let us take hands and help, for this day we are alive together.'"<sup>21</sup>

Nor was this merely a ghastly attempt to smile. Those who knew Clifford personally and are best qualified to speak tell us differently. Says Sir Frederick Pollock:

"It was far from him to grudge to any man or woman the hope or comfort that may be found in sincere expectation of a better life to come. But let this be set down and remembered, plainly and openly, for the instruction and rebuke of those who fancy that their dogmas have a monopoly of happiness, and will not face the fact that there are true men, aye, and women, to whom the dignity of manhood and the fellowship of this life, undazzled by the magic of any revelation, unholpen of any promise holding out aught as higher or more enduring than the fruition of human love and the fulfilment of human duties, are sufficient to bear the weight of both life and death. Here was a man who utterly dismissed from his thought as being unprofitable, or worse, all speculations on a future or unseen world; a man to whom life was holy and precious, a thing not to be despised, but used with joyfulness; a soul full of life and light, ever longing for activity, ever counting what was achieved as not worthy to be reckoned in comparison with what was left to do. And this is the witness of his ending, that as never man loved life more, so never man feared death less. He fulfilled well and truly

<sup>21</sup> Clifford, "The First and Last Catastrophe": *Lectures and Essays*, Vol. I, p. 225.

that great saying of Spinoza, often in his mind and on his lips: 'A free man thinks of nothing so little as of death.'"<sup>22</sup>

#### XVIII. BEYOND THE ATHEISTIC POSITION.

Voltaire spoke from a deep knowledge of the human heart when he said that if there were no God it would be necessary to invent one. It must be admitted that the road of the atheist is no easy one to travel. Strong man that Clifford was, by his own confession his loss of faith shook him to the foundation. G. J. Romanes bears testimony to the same thing:

"When at times I think, as think at times I must, of the appalling contrast between the hallowed glory of that creed which once was mine and the lonely mystery of existence as I now find it, at such times I shall feel it impossible to avoid the sharpest pang of which my nature is susceptible."<sup>23</sup>

The difficulty is great, but greater for him who has once known theistic faith than for him who has nothing to unlearn. Nevertheless, with or without this background there is something lacking in the atheistic position, a certain absence of purpose in the Cosmos, an utter irrationality of structure in which our rational instincts feel strangely out of place. Hence the profound wisdom of Voltaire.

But what then? Are we to turn to the only other logical alternative? It is the face of a Gorgon; upon it no man may look and preserve his soul alive; while atheism, though it leads one by a hard and lonely path indeed, has been followed with courage and good cheer. And if we cannot do likewise, is it not a fair inference that the fault is not in our stars but in ourselves that we are underlings? Have not generations of heredity under an artificial stimulus had their effect in rendering us incapable of coping with reality? Must we not, as Clifford said, face the fact and make the best of it?

Or are we to abandon logic as a product of the hypertrophied intellect, and seek refuge in sentiment, surrendering to imperious human need? Many, very many do so, and are swept along by the swelling, thrilling, lulling tide of religious emotion. But there are those who cannot go this way. To them logic is duty and sentiment pleasure. There is a picture which I have seen somewhere; I think it is called "The Eve of St. Bartholomew." It represents a young Catholic girl trying to fasten upon the breast of her Huguenot lover a token which will preserve his life. He knows, as well as she, the

<sup>22</sup> Introduction to Clifford's *Lectures and Essays*.

<sup>23</sup> Physicus (G. J. Romanes), *A Candid Examination of Theism*, p. 114.

danger that threatens him, and the potency of the token to protect him; but his hand stays hers, and his eyes meet hers with a look that says:

"I could not love thee, dear, so much,  
Loved I not honor more."

It is to such unfortunates that I speak; to those who know the appeal of religious emotion, but feel it forever denied them; who feel the incompleteness of atheism and the need of something more than it can supply. What is there beyond the atheistic position? Not of man's invention; we are asking for bread, not a stone; but is there no indication in nature of that for which sentiment yearns? If nature is soulless, if her wonderfully complex body has no spirit, then at least may we not look forward to a time when this shall no longer be?

#### XIX. THE BODY OF THE COSMOS.

Of what does this soulless body of nature consist? To the superficial view, to the unaided eye, there is the earth with all the varied flora and fauna that inhabit its surface. There are the moon and the sun and the other planets of our system. There are, too, the stars, suns in themselves, possibly with planetary families, and (who knows?) perchance with sentient, rational beings inhabiting certain favored ones among these satellites. Calling the telescope to our aid, the macrocosm is revealed to us; stars, nebulas, star clusters, and again stars, nebulas and clusters, reaching to distances so remote that mind falters in the conception; separated, star from star, by great gulfs of space, adequately measurable only in terms of the years required for light to traverse them; yet across these stupendous distances the faint, persistent pull of gravitation is doubtless felt and reciprocated.

The microscope reveals to us the microcosm in its upper stages. Tiny living creatures of a single cell only; smallest of all, so intimately bound up with man's welfare. And at the very verge of the power of the microscope we begin to see the peculiar Brownian movements of minute suspended particles in a liquid, movements we know to be caused by the jostling and collision of the still smaller and more rapidly moving molecules. And with the eye of reason we have learned to see these molecules made up of atoms, and the atoms of electrons, the latter arranged (most wonderful of all!) after the manner of a planetary system; for from electron to star the architecture of the Cosmos is after the same pattern.

Passing upward from the electron to the atom, the molecule,

the cell and living creatures of many cells, we progress by steps of increasing complexity and specialization, until when we reach the earth itself with its variegated surface, and the living creatures that inhabit it, we have presented to our vision an organism which by its relatively high development and complex structure may be regarded as a temporary stopping-point; for no sooner do we pass to ultraterrestrial nature than we return at once to the simple structure of the atom, on an immense scale, it is true, but simple beyond all comparison with that which we have just left; and as far as our vision can reach throughout the macrocosm the same simplicity prevails. A faint tendency toward specialization may be recognized in certain star groups, which form with their putative satellites a common family; but the telescope reveals to us in the macrocosm nothing of a greater degree of complexity than the analogue of a chemical molecule. If there be indeed a cosmical analogue of the cell it so utterly transcends our outlook that it is beyond profitable speculation.

I have said that the terrestrial organism may be regarded as a temporary stopping-place. Its evolution is undoubtedly far from finished. It is only within the "wonderful century" that it has developed a nervous system, which of late years even shows signs of eliminating its wire-nerves without hindrance to its function. Ignorance and superstition still coexist side by side with the greatest enlightenment; preventable disease still flourishes; international law is still in its incipience. But inchoate as it is, there is nothing within our ken in all nature with which it may be compared.

Whither, then, should the lonely soul, in quest of a companion soul in nature, direct its search? To those spiritually barren, if physically grand and imposing regions of space where it will find nothing nearer its own development than a cosmical molecule? As well may it seek kinship and spiritual sympathy in the microcosm, among those molecules and structural units of whose combinations it is itself the climax. Rather, since the human soul itself is found in its perfection only as the flower of the most complicated and specialized organism, let it seek a kindred soul in nature where nature exhibits its fullest and most intricate evolution. Here, if anywhere, must it hope to find the object of its search.

## XX. A WORD OF CAUTION.

A word of warning may not be out of place here. In its quest for evidences of a soul in nature let not the human soul expect too much. The soul of man is itself the product of ages of slow and

painful progress, a progress sometimes halted and even turned backward for centuries, and long was that earlier time that elapsed before its bodily tenement was fit to receive it. Even to-day its development is far from complete. And so, in examining the body of nature in search of a soul, we must not look for more than its bodily development will warrant.

In the first place, we notice that that portion of nature which is organized and developed to the highest degree, as far as our ability to observe goes, is of limited extent; a thin veneer on the surface of a large, soulless ball. Moreover, this layer is by no means uniformly distributed. If we were to find, in examining a certain living creature, that portions of its tissue were not reached by either the circulatory or nervous system, we should not expect to find much of interest in these parts. As a promising field for study we should rather choose those parts which exhibit a higher grade of development. And so we find it in the body of nature. The poet may take the wings of the morning and dwell in the uttermost part of the sea, but the philosopher will say that the poet finds there only that which he took with him. The most highly developed portion of nature's body is at present but a thin veneer applied here and there in irregular patches on the surface of the earth. Its activities may extend a mile or so below the surface and a few miles above; beyond these limits we pass abruptly to a region of development incomparably simpler.

In the second place, this optimum region is comparatively new, measured in cosmical units of time. History calls a thing old if it dates back to a period five or six thousand years before our day; geology counts years not in thousands but in millions; and cosmology goes still farther. The age of man on the earth has of late years become ascertainable to a fair degree of approximation. There were inhabitants in the Nile valley who were sufficiently developed to understand the burning of brick and pottery at a time which may be as much as 16,000 years ago.<sup>24</sup> The splendid wall-paintings in the caves of the Pyrenees are believed to be over 15,000 years old.<sup>25</sup> The complex civilization of Assyria, with its priests, bankers, and

<sup>24</sup> Records of the height of the annual Nile flood are available as far back as the XXVth Dynasty (700 B. C.). From these it appears that the Nile has been silting up its bed at the rate of  $4\frac{1}{2}$  inches per century on an average. Numerous borings to a depth of 60 feet in the alluvium of the Nile valley have shown the presence of burnt brick and pottery down to the lowest levels. The period of 16,000 years indicated by this is as likely to be longer as to be shorter, on physical considerations. See *Enc. Brit.*, 11th edition, Vol. XIX, p. 696a; and Vol. II, p. 115b.

<sup>25</sup> Osborn, *Men of the Old Stone Age*, pp. 18, 414f.

merchants, and other institutions familiar to us, is now known to reach back to a time at least 6000 years ago, and such degrees of skill and social complexity were not reached in a day. The years of *homo sapiens* are to be measured not by thousands but by tens of thousands.

But such periods are as nothing in cosmology. Some half century ago Lord Kelvin, on the basis of certain physical laws of the conduction of heat, stated that the period of time that had elapsed since the earth's crust had solidified was not more than 400 million years, and might be as short as twenty millions. The biologists protested against being limited to what they deemed too short a time for organic evolution, but Kelvin was inexorable. Since the discovery of radio-active bodies certain of Kelvin's fundamental postulates have had to be seriously modified, and biologists have, as far as this argument is concerned, been given practically as much time as they desired. In comparison with such lengths of time a few tens of thousands of years are inconsiderable. Anything approaching a fit physical setting for a cosmical soul is of extremely recent origin, and such a soul may therefore be expected to be still primitive in its development.

In this region, limited in space, and of recent origin, we must hope to find, if anywhere, evidence of a *cosmic soul*.

## XXI. THE COSMIC SOUL.

In gathering, scrutinizing, and appraising the evidence in the case it will be difficult for the human mind to act impartially. Not that it is likely to claim too much credit; the error is apt to be the other way. Through modesty the human soul will rather disclaim credit which is properly due. And in the quest for traces of a cosmic soul we cannot set aside the human soul. It is in itself the flower of nature, the climax of evolution, the heir of all the ages, and among the phenomena which it exhibits we are most likely to find a hint of what we are seeking.

I have said advisedly, among the phenomena—for there is much which the mind of man shares in common with the lower order of creation, and much also of which man has reason to feel ashamed. There is nothing characteristically human, for instance, about the instinct of self-preservation, or the emotions of jealousy, fear or anger. Even the higher quality of permanent attachment for a spouse is found in the birds, and the beginnings of maternal affection are to be seen in the cow and other animals. But there is to be found in man a group of mental characteristics which rather

sharply divide themselves from the others, inasmuch as they oppose rather than assist man in attaining harmony with his environment, and have sufficient vitality to shape the environment to their standards.

Certain of these qualities we have already had occasion to discuss. We have seen how, in various ways, the ancient way of nature grates upon the sensibilities of this new-comer, man; how his sense of pity interferes to prevent the weaker from being trampled underfoot; how his sense of justice cries out at the sight of the suffering of the innocent; how his sense of beauty and even decency is offended by the loathsome parasites that infest creation; how a sense of shame, peculiar to him alone, loads upon him an extra burden in the struggle for existence. In all these cases, the recognition by man of the fact that these instincts or mental attitudes are at odds with nature, instead of causing him to abandon or modify them only causes him to grapple them to his soul with hoops of steel. There is that in man which commands allegiance before natural law. There is that within him which cries to nature for bread and receives a stone. There is that within him which half recognizes, half hesitates to believe its own superiority. And for all this he is not without precedent.

The first manifestations of life on our earth, simple as they may have been, were undoubtedly as great an innovation upon the established order of nature, as much an exotic and transcendental phenomenon, as completely at odds with the usual course of their environment as is any modern soul wrung by the mystery of evil. Feeble must have been life's first beginnings; many incipient sparks of life must have flickered fruitlessly out; but chance and a kindlier environment preserved others, and the flame grew, slowly at first, doubtless, but with ever-increasing rapidity, until it flowered in the human soul. And here, among man's highest psychic phenomena, he who hath eyes may see the beginning of a new thing, as wonderful as the beginning of life itself, and destined doubtless to modify as profoundly the environment into which it is injected.

How powerful, for instance, is the appeal to human idealism, as illustrated in the founding and early growth of Christianity. I speak as one who rejects utterly the miraculous in the Christian legend, and speak to those who presumably do likewise. A cardinal feature of early Christianity was its appeal to the idealistic as opposed to the materialistic. "Go and sell all that thou hast, and give to the poor, and come and follow me." "It is easier for a camel to pass through the eye of a needle than for a rich man to



enter the Kingdom of God." Jesus and his little company of disciples actually lived from day to day by the charity of the sympathetic.<sup>26</sup> Prudence, forethought, the economic virtues in general, were actually frowned upon. "For after all these things do the Gentiles seek." Here we have an appeal directly counter to material self-interest; but this is not all. The founder of Christianity even went farther, and set himself in opposition to the physical instinct of self-preservation. "But I say unto you that ye resist not evil." What chance, judging from all analogy of the lower orders of nature, would such a doctrine have of survival and self-perpetuation?<sup>27</sup>

It is of no consequence to the present argument that during the ages after the death of its founder the Christian Church did not always despise force or riches in its efforts to extend itself. The point is its ability to have made a start at all from this basis. There were, of course, other factors operating, such as the constant presentation of the doctrine of immortality; and we must remember that everything took place in a dense haze of superstition, similar to those mists which overhang and foster the teeming tropical vegetation. But by far the largest factor in the success of early Christianity was the idealism of its founder. No other appeal than the idealistic can so inspire love, reverence, and devotion in the disciple, or so nerve the martyr. "The things that are not seen are eternal."

In more modern times we have again seen the strength of the appeal to idealism. The early years of the American Civil War, marked as they were by Confederate successes, were trying times to the Federal Government. There was a steadily increasing danger that England's material needs and interests would lead her to take the step of recognizing the Confederacy. With profound insight Lincoln decided to appeal to the idealistic as against the materialistic, and raised the issue of Emancipation. England, desperately as she needed cotton, was proud of the fact that she had, years before, been the second European power to abolish her slave trade.<sup>28</sup> She could not resist the appeal, and the question of intervention on the South's behalf was settled in the negative.

Our own people also felt the force of the appeal: "Choose you this day whom ye will serve." Wavering hearts were encouraged. The fortune of war began to turn. The year of the Emancipation

<sup>26</sup> Matt. x. 9-11; John xii. 6.

<sup>27</sup> Mather, "Parables from Paleontology," *Atlantic Monthly*, July, 1918, especially Sect. 4, p. 39.

<sup>28</sup> Denmark abolished her slave trade in 1802, and Great Britain in 1808.

Proclamation saw the high tide of the Confederacy. The war had become a crusade.

"But what is this?" says the theist. "In your search for what you call a cosmic soul you have come upon God Himself. It was the Divine element in Christianity that gave it its power over entrenched paganism; it is from God that these ideals come, so opposite to the natural mind; it is by God's help that the righteous cause triumphs."

Well and good, if you will have it so; but remember that every argument for God is subject to the *reductio ad absurdum* of the Argument from Design. Admitted, if you please, that there is a God; but what kind of a God? Taking the good and the evil together in nature, as we have seen, the only logical theistic position is to recognize a God without benevolence.

The whole aspect of the case is changed if we do not postulate a Divine origin for human idealism. Instead of regarding it as a revelation of the Perfect to His own imperfect creatures, if we consider it as marking a successful step in the struggle of the imperfect toward higher things, the difficulty disappears. In no measure is the soul of man responsible for the established order of the universe. He may be benevolent, but he is not omnipotent.

In this new thing, manifesting itself in and through man, slowly beginning to be, this transcendental exotic, this "hyper-trophied intelligence," if you will, we may fairly recognize the rudiment of a Cosmic Soul; cosmic because its outlook and activity are not limited to the immediate interests of the particular organism through which it makes its appearance, but are of a catholic vision and sympathy commensurate to the Cosmos itself; a soul, because if anything ever deserved the appellation spiritual with all that it connotes, surely this is worthy. It is not much; I have shown that we cannot as yet expect much. It by no means measures up to the exacting standard which man requires of his God. It never can be omnipotent, but it holds within it a splendid promise. And the most exquisite thing in this connection is man's unconsciousness of the part that is given him to play, like Moses of old, who wist not that his face shone.

But there have been those who have realized this. Olive Schreiner, in her "Dream in a Ruined Chapel," has beautifully set forth the conception of a Cosmic Soul, clothed with the outward attributes of time and space and circumstance whereby the individual life is marked off from the life of the whole.<sup>29</sup> The German

<sup>29</sup> Ralph Iron (Olive Schreiner), *Dreams*, p. 71.

philosopher Feuerbach<sup>30</sup> was also aware of man's intimate connection with the Cosmic Soul, but, like Royce, went to the extreme of apotheosizing man. God, he held, is nothing else than man; He is the outward projection of man's inward nature. Swinburne, too, sings of "The great god, Man, which is God."<sup>31</sup> And Clifford, in one of his essays, says:

"For after all, such a helper of men, outside of humanity, the truth will not allow us to see. The dim and shadowy outlines of the superhuman deity fade slowly away from us; and as the mist of his presence floats aside, we perceive with greater and greater clearness the shape of a yet grander and nobler figure—of Him who made all Gods, and shall unmake them. From the dim dawn of history, and from the inmost depths of every soul, the face of our father Man looks out upon us with the fire of eternal youth in his eyes, and says: 'Before Jehovah was, I am.'<sup>32</sup>

## XXII. THE DESTINY OF MAN.

So great a thing as the beginning of a Cosmic Soul cannot take place without leaving some impress, slight as it may be at the start, upon that portion of the Cosmos where it first sees the light. New as it is, the Cosmic Soul has already left its mark on nature. The wolf (or something which differed from him only in the pupil of the eye)<sup>33</sup> has become a dog, and, incidentally, the only living species which appreciates man at his true value; the long-horned lean steer of the plains has become unrecognizable as the solid, beef-yielding animal of the ranches; even the cactus has become edible. Nature's perennial waste of spring freshets and summer droughts is at the beginning of its end; for at the headwaters of our great rivers vast reservoirs impound the melting snows of Minnesota or the rains of Abyssinia, holding them against a time of need, that the Father of Waters or the beneficent Nile may run unvexed to the sea in bountiful yet gentle measure. The desert

<sup>30</sup> Feuerbach, *Das Wesen des Christentums* (translated by George Eliot, *The Essence of Christianity*): "In religion man contemplates his own latent nature" (p. 33); "God is nothing else than the nature of man purified" (p. 181); "The beginning, middle, and end of religion is man" (p. 184). Also *Enc. Brit.*, 11th edition, Vol. X, p. 302d.

<sup>31</sup> Swinburne, "To Walt Whitman in America," in *Songs Before Sunrise*:  
 "The soul that is substance of nations,  
 Reincarnate with fresh generations,  
 The great god Man, which is God."

<sup>32</sup> Clifford, "The Ethics of Religion": *Lectures and Essays*, Vol. II, p. 243.

<sup>33</sup> *Enc. Brit.*, Vol. VIII, p. 374b.

has been brought under cultivation, and the pestilential tropical jungle has been made healthier than many an old established city of the temperate zone. Much has been done to bring the environment into harmony with the spirit, but much more yet remains to be accomplished.

"And what then?" says the pessimist. "*Cui bono?* Man is not immortal, either in the individual or the race. The earth will not always be habitable; even the sun is doomed to ultimate extinction. All nature is like a mighty clock, steadily running down. What shall it profit us if we build and plant and water?"

Here we encounter another of the characteristic qualities of the Cosmic Soul: hope, incentive to effort, apparently without reason.

"Such splendid purpose in his eyes;  
Who rolled the psalm to wintry skies."

For the pessimist is right this far: nature if left to itself, is destined to a veritable *Götterdämmerung*, a Twilight of the Gods.

No physical principle is better established than that of the dissipation of energy. According to it, all the different forms in which the energy of the universe manifests itself are convertible one into another, but not with equal facility. Heat is regarded as the lowest form of energy, because all other forms of energy can be completely converted into heat, but the conversion of heat into these other forms takes place only partially. The net result of the continual transformation of energy that is going on throughout the universe is that the proportion of energy which becomes unavailable in forms other than heat is continually increasing. Eventually all other forms of energy will have become converted into heat.

Moreover, heat, like water, naturally runs downhill; that is, a difference of temperature tends to equalize itself. Hot bodies cool off, warming up their surroundings until the temperatures are equal. Eventually, therefore, all nature will come to the same level of temperature.

Now, it is not possible by any means at our disposal to recon-vert heat into other forms of energy unless it exists at different temperatures, just as it is not possible to obtain work from water, no matter how much there is of it, unless some is at a higher level than the surrounding objects. Hence nature, having run down to a dead level of temperature everywhere must, according to its own laws, remain in that condition forever. Having reached this permanent state the universe will be like a mighty pool of Bethesda, awaiting some influence from without to trouble its waters, to dis-

turb once more the level of its enormous store of useless energy and render it again available.

"If left to itself—according to its own laws." Very true; such is the inevitable destiny of a soulless world.

Here we come to a strange and wonderful thing; for it was pointed out years ago by Clerk Maxwell that it lies within the power of intelligence, even though for the present in theory only, to interpose, to change the current of nature, to turn its mighty mechanism backward, to rewind the clock, by actually causing heat to run uphill. His conception of "sorting demons" is well worth the study necessary to appreciate it. He points out how, without the expenditure of any work, an intelligence provided with a sufficiently delicate touch and powerful vision could raise the temperature of one half of a mass of gas by withdrawing heat from the other half; a thing up to the present time totally against experience. Such a proceeding as Maxwell suggests is impossible to us at present only because our faculties are too gross to permit of our carrying out the delicate sorting of single molecules necessary to accomplish this end; but he would be bold indeed who would deny the possibility of our ever achieving a touch and vision adequate to this purpose.<sup>34</sup> Since Maxwell's day,

<sup>34</sup> Maxwell appears to have first published his suggestion of "sorting demons" in his *Theory of Heat*, p. 328 (1875 edition), under the caption: "On the Limitation of the Second Law of Thermodynamics." See also Garnett and Larmor, *Enc. Brit.*, 11th edition, Vol. IX, p. 401b.

In a gas at what we consider uniform temperature all the molecules have not exactly the same velocity, their velocities being grouped about a mean value according to a distribution closely resembling the well-known probability curve. This is a condition of stable equilibrium, to which every other distribution of velocities must in time revert, due to the interchange of velocities by oblique collisions at all possible angles. The whole matter hinges upon the stability of this system of non-uniform velocities. If we in any way remove the most rapidly moving molecules, others with speeds nearly as great will shortly replace them, and the whole set will again assume the stable distribution about a mean value slightly less than before. Similarly, the removal of the slower molecules will result in a rearrangement of velocities about a slightly greater mean.

Maxwell imagined such a gas divided into two parts, A and B, by a partition containing a great many small, massless doors, each in charge of an intelligence, or a "demon," as he called it, with instructions to open his door whenever he saw one of the more rapidly moving molecules in A headed his way, and to keep it closed against the slower ones. Similarly, he was instructed to allow to pass from B into A only the slower molecules. Thus, the original set of molecules would, without the expenditure of any work, be sifted into two classes, the rapid ones finding themselves in B and the slower ones in A, the temperature of the portion B rising, and that of A falling. The restorative action would again produce molecules in A nearly as fast, and in B nearly as slow as those which had been lost, and the process is capable of limited repetition, ceasing to be useful when the most rapid of the slow molecules are equal to the slowest of the fast molecules.

The temperatures of the two portions of gas may now be allowed to adjust themselves to a level in the usual fashion, a certain amount of work being recovered in the process, and the sorting repeated. In this way the temperature of the gas as a whole may be depressed to any desired point.

a long step has been taken in this very direction. It is now possible for us to count singly bodies much smaller than the average gas molecule, and even to see their single impacts against a phosphorescent screen.<sup>35</sup> All this in one generation; what may we not yet accomplish?

Maxwell's proposed sorting of molecules is unique in the domain of physics in that it is the first case known where natural law is exhibited as a respecter of persons, having a mode of operation applicable to non-intelligent matter, but reversible under the guidance and control of intelligence. It is not metaphysical, but as legitimate a deduction from the molecular structure of a gas as any of the better-known physical principles. It is full of suggestion, of inspiration. Shall we learn, ere the coal-beds are exhausted, to draw energy from the atmosphere until it is cooled below the temperature of the ocean, when a mighty store of energy will at once become available for our use? Shall the down slope of nature's curve, through human interference, turn upward again? And what if, as the curve nears its summit, some great catastrophe, some celestial collision, should suddenly extinguish all intelligence on the earth, and the dissipation of energy should again prevail, until, eons after, some new race of sentient beings may speculate on origins and destinies and perchance discover anew the way to apply the brakes and reverse the power?

It is a solemn thing to consider that there is developing in nature, in and through ourselves, an intelligence of such mighty possibilities; rudimentary as yet and feeble, but of rich promise; painfully out of joint with much of its environment (as the cynic points out) like the Ugly Duckling, yet destined to master this environment and impose its ideals upon it. What though it may be ages yet before this promise shall be fulfilled, before the ugly duckling shall become a swan? Have we not, in this precious possession of which each one of us holds a share in trust, an incentive to right living, to high thinking far more worthy of our devotion than any selfish salvation of the individual soul? What though we shall never live to see the final victory? Like Simeon in the temple we may say: "Lord, now lettest thou thy servant depart in peace—for mine eyes have seen thy salvation."

We have gone beyond the atheistic position. We have seen the body of the Cosmos, like some mighty machine, wound up and set going ages since, by whom we know not. What has become of its

<sup>35</sup> Rutherford and Geiger, *Proc. Roy. Soc.*, 1908, 81A, pp. 141, 163. Also Crookes, *ibid.*, 1903, 71, p. 405.

Creator, if it ever had one, we cannot tell. Perhaps he is talking or pursuing, or he is in a journey; or peradventure he sleepeth and must be awaked. In the absence of any intelligent control this machine, like a great clock, is steadily and relentlessly, after its own laws, running down; and with each hour it strikes a different scene presents itself. There was that matin hour when the morning stars sang together, and all the sons of God shouted for joy; there is now the high noon of life and activity and pleasure and pain; and there is coming that vesper hour of twilight, that *Götterdämmerung*, when the restless waves of energy shall have quieted down to a dead, dark level forever. And into this machine, in the full stir of its activity, there comes a new thing, an exotic, a transcendent influence, a Soul. Lonely, ill at ease, out of joint with its surroundings, shocked and horrified by much of what it finds about it, its plight is pitiable. "I am a little soul, dragging about a corpse." Man himself, in and through whom it makes its first appearance, fights it with tooth and nail, rack and fagot, slander and venom, ostracism and starvation, bullet and poison gas. And the wonder of it—for the feeble thing still lives!

It lives and grows. It is beginning to be conscious of its own powers. It is optimistic; it is fearless; it is developing. Let none set metes and bounds for it. It may yet turn the ebbing tide of nature, and stay the coming of the twilight hour; for *Götterdämmerung* is ages away, eons away; there is time. It may yet (who knows?), as its own nervous system is beginning to do, shake off the limitations of matter only to function the more freely and fully. The little soul, now chained to a corpse, may yet be set free. The Cosmos, so long soulless, may yet redeem itself, and possess a controlling soul worthy of its splendid body; for it doth not yet appear what we shall be.