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An End to History: Science Fiction in the Nuclear Age

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"I suppose there's no way of putting the mushroom cloud back into that nice shiny uranium sphere."

Isaac Asimov

"How Nice to be a Physicist in 1947"

Science fiction, at least a significant fraction of it, is the literature of the "other" culture, the culture of science and technology. Its double audience has always included not only scientists and technicians but also the general public in search of diversion. It communicates the experience and speculations of the former to the rest of society. It represents the world-view of scientists and technicians to those who participate only passively in an increasingly mechanized society.

The late forties and early fifties was a time of unusual literary activity by scientists and engineers. John Campbell, editor of *Astounding*, began to encourage the participation of scientists in the writing of science fiction prior to World War II. In the wake of the War this participation increased dramatically, both in quantity and quality. The War and its aftermath apparently struck some resonant chord which drew serious scientists and engineers like Fred Hoyle, Isaac Asimov, Arthur C. Clarke and even Leo Szilard into the world of the imagination.

Whatever the difficulties in verifying the general thesis presented above concerning the relation of science fiction to its readers, in this limited period there can be little doubt that a large body of science fiction writing did indeed represent science to society. What is more, many of the themes still treated in science fiction by non-scientists originated in the scientific community at this time. The social history of science sheds light on the science fiction of the nuclear age, and vice versa. The literature can be understood as a reflection on the specific dilemmas confronting this social group. Or rather, it would be more accurate to say that it universalizes and mediates the unique response of the scientific community to dilemmas confronting not just scientists but everyone in the United States in this period.

In the immediate post-War period American scientists were caught in a contradictory situation about which they had very ambivalent feelings. Large scale changes were taking place throughout the American economy and society due to a new quantum leap in the concentration of capital and the size of government. The trend toward "big science" organized on the corporate-bureaucratic model was greatly accelerated by the War and its ultimate implications had become visible to all at Los Alamos.

The individualism of little science, in some ways comparable with artisanal status, was giving way to mild forms of the corporate collectivism, conformity and alienation already typical of the world of big business and government. The old ideal of the wise and gentle mathematical poet, incarnated for many by Einstein, was subverted by the reality of the academic entrepreneur, the middle man between a more bureaucratically organized scientific community and the government which funded it.

Of course some scientists gained an immensely increased power and sense of power from this change, while most others found their material situation dramatically improved. On the whole the new era was well received and scientists felt their social value was recognized at last. But even so, increased influence implied increased dependency and top down control, concomitant changes which inevitably produced powerful frustrations and ambivalences.

For many social groups similar changes were traumatic. Scientists profited from then. Still, traditional value systems and role models were subverted by the new organization of scientific labor, and there was a widespread sense of "wrongness" in the scientific community, expressed in hostility to government control, the new security systems, worry over the bomb, the fate of Oppenheimer, and related issues.

The physicist Arthur Roberts captured the contradictory spirit of the times in satirical songs which were widely circulated among scientists in the late forties. The lyrics of one of them, quoted here, may take the place of volumes of sociological analysis.

*How nice to be a physicist in 1947,
To hold finance in less esteem than Molotov or Bevin,
To shun the importuning men with treasure who would lend it,
To think of money only when you wonder how to spend it.
Research is long and time is short!
Fill the shelves with new equipment,
Order it by cartload shipment,
Never give a second thought:
You can have whatever can be bought.
How nice to be a physicist in this our year of grace,
To see the scornful world at last admit your rightful place,
To see the senators defer to every wise pronouncement,
To fascinate the women's clubs and star at each commencement.
Research is long and time is short!
Drink your fill of adulation,
Glory in the new sensation.
Never give a second thought:
Sinatra holds a place that many sought.
But have you sought a physicist and place for him to dwell,
And searched the town in vain to find a vacant dungeon cell,
Or tried to teach a thousand students who can't do a sum,
The girls who'd like to be Greer Garson finding radium?
Research is long and time is short!
Board the thesis, drive the student,*

*Physics was his choice imprudent.
Never give a second thought:
Brains are still a thing that can't be bought.
Or did you write a book on fission that you tried to sell,
Or wonder while you lectured what you could or could not tell,
Or try to get declassified some nuclear equations,
Or wonder if the work you do was done at secret stations?
Research is long and time is short!
If you find a fact essential,
Classify it confidential.
Never give a second thought:
The FBI's approval must be sought.
How nice to be a physicist in 1947...
How nice?
How long do you think it would take to learn something about, uh, butterflies?*

These are some of the sorts of problems reflected in the science fiction of this Period. Of course the new "scientific statesmanship" of the day also addressed these problems in articles and lectures on public policy. But the political leaders of the scientific community had ulterior motives and were willing to make major concessions to the dominant mood and opinions of their audience to get what they wanted-- increased funding, disarmament negotiations, etc. Science fiction was freer to express the full depth of anxiety and even opposition of scientists. Judith Merrill exaggerates only slightly when she says that in the McCarthy era, "science fiction became, for a time, virtually the only vehicle of political dissent."

Viewed in this light science fiction resembles the "positivist" philosophies of Saint-Simon and Comte which, at a much earlier date, also attempted to universalize the world-view of the new technical strata generated by 19th century capitalism in opposition to the dominant values and institutions of this society. But the passage from philosophy to literature reflects a change in the self-consciousness of many scientists and technicians. Perhaps they cease to take themselves quite so seriously (Saint-Simon and Comte had proposed that they should rule the world), or perhaps they discover that they can only reach others by appearing to do so. In any case the literature which represents them presents itself as mere popular entertainment and not as Truth or Art. Yet this is clearly a ruse, like the borrowed voices of Szilard's dolphins through which alone scientists can convince others to listen to their views on world problems.

Leo Szilard's story, "The Voice of the Dolphins" (1961) is in fact a metaphor for science fiction itself. It is a charming summum of the sort of approaches to world problems which fascinated many scientists in the preceding decade. But the "voice" of science is ignored until a group of researchers pretend to have understood the language of the dolphins, from which they obtain the solutions to all outstanding world problems, from hunger to disarmament. Szilard's dolphins are presented to the public as alien and superior intelligences, but there is irony in the fact that these intelligences walk among us incognito in the person of scientists.

In science fiction too science borrows a "voice" from literature in order to make itself heard and understood. The interpretation of science fiction is, perhaps more than that of any other literary form, translation from one language to another.

The Distorting Mirror

Like the mystery story the science fiction novel is based on literary techniques developed by the great novelists of the 19th century. The heritage is, of course, drastically simplified in modern popular fiction. In addition, as a literature which represents scientists and technicians, science fiction has had to develop a number of specialized techniques to bridge the gap between the experience of its social base and literary expression. These techniques do not produce a "realistic" literature in the sense in which the traditional novel is so described. They are a distorting mirror in which activities and experiences so alien to ordinary life as to be "unprosaic" are reflected back in a communicable form.

The realistic novel requires characters whose lives reflect real historical forces, characters representative of the social classes and involved in the national adventures which actually make history. The struggle of the scientist and technician for knowledge and power over nature does not meet this requirement. It is one thing to generate a dramatic narration around the exploits of representative individuals as did the great 19th century novelists, and quite another to develop even so much as an interesting story out of the life experience of researchers whose great personal adventures and triumphs are largely incomprehensible to the uninitiated. Napoleon and Patton have their movie biographies, not Newton and Einstein although there can be no doubt which was the greater pair of men.

Thus science fiction is confronted with a problem at the outset: its social base cannot be realistically represented, however interesting in themselves the products of real and possible science may be. The solution to this problem lies in a radical shift in the normal foreground-background relations of the realistic novel. The novel subordinates the "totality of objects" as background to the human interactions which are its central concern. Science fiction pushes the object to the center of the stage and subordinates the characters to it.

Harry Bates' story, "Farewell to the Master" (1940) might almost be a comment on this reversal of the roles of objects and persons in science fiction. Gnut the robot and Klaatu, a man, arrive in Washington on a "space-time traveler" from a more advanced civilization than that of earth. As they step from their ship, Klaatu introduces himself and his companion and then is shot and killed by a madman before he can explain their mission. The robot Gnut freezes in his tracks and is assumed to be inoperative until photographer Cliff Sutherland notices a small change in his position from one day to the next. Cliff discovers that Gnut is engaged in a mysterious nightly activity aimed at reconstructing Klaatu from a recording of his voice made just before he was shot. At the end of the story it appears that Gnut will be able to bring Klaatu back to life, thanks to the help of Cliff Sutherland through whose eyes the reader follows the robot's adventure.

As the robot prepares to leave, Cliff asks him to "tell your master" that humanity regrets his rude reception. "You misunderstand", the mighty robot...said. 'I am the master.'" And with these words, the space-time traveler departs, leaving Cliff in awe and bewilderment at what is evidently the future fate of humanity in a world ruled by robots.

There is, however, nothing mysterious about the fate of humanity, of character, in Bates' literary technique: Gnut dominates the narrative as surely as he does his land of the future: the characters are mere stereotypes forming the setting for the portrayal of the activities of a machine. Of course Gnut is no ordinary machine. He is an example of what might be called the "technological exoticism" of science fiction by which it focuses the attention of the reader on objects instead of character.

Three standard techniques are available to science fiction writers for the purpose of generating an exotic universe. The first and simplest is extrapolation. The science fiction writer wishes to comment, as does Bates for example, on the growing importance of machines. He cannot produce a story by showing the dull (to outsiders) work of making and operating existing machines. Instead he extrapolates to the total machine, the robot, which takes over all the functions of man in the present society. In the process the robot becomes the subject of the story constructed around it. Similarly, Jules Verne conquered space at the dawn of the science fiction era by extrapolation from artillery.

The second basic technique is analogy and especially analogical extrapolation. After the conquest of space, why not that of time? H.G. Wells' *Time Machine* added a new device to the repertoire of science fiction technology, from which Bates, like so many others, simply borrowed it. In a host of post-War stories the conquest of physical nature through nuclear power is mimicked in the parallel conquest of psychic nature through telepathy, telekinesis, etc. The transmutation of elements in the cyclotron becomes the analogon to the achievement of every other wild dream of alchemy and magic.

The third technique I will call the "thought experiment." It consists in setting up an artificial situation and then developing its consequences. Visitors arrive from the future or from outer space: how will mankind respond? The human race leaves the earth: how will the intelligent dogs they leave behind reconstruct the history of the planet thousands of years later? A child brought up by Martians comes back to earth: how will he react to his fellow humans and they to him? Here the story begins rather than ends with the intervention of the *deus ex machina*.

These techniques and others like them subvert traditional novelistic form. History, the medium of the realistic novel, may disappear or be subordinated to nature and the technical applications of the laws of nature. Characterization too is reduced to a few elementary psychological devices: the characters' main function is to display the imaginary universe of the story.

This impoverishment of the form brings it back to the didactic simplicity of an 18th century philosophical novel like *Candide*. This is precisely the goal. Science fiction is a highly reflexive literature: the author intervenes constantly through the narrator and the characters to comment on the meaning of the story. He has a message which is illustrated by the events he describes. Like the scientists and technicians whose world-view he often represents, the author may not be able to live the great political and economic problems of the age and represent them through realistic human types. But he does have ideas about these problems and feels that his insider's view on the sources of technological progress gives him a special qualification for speaking his mind. The devaluation of history, the simplification of characterization clear the ground for the metaphorical expression of the views of a marginal social group.

What were these metaphors and views in the period under consideration here?

Totalitarian Enlightenment

The social goal of science is ostensibly the liberation of mankind through progress in power over nature. One major tendency of early science fiction responded to these ideological pretensions of scientific rationalism with images of a world wisely governed by scientists and technicians. This was the literature of positivism in the 19th century sense of the term. H.G. Wells' fantasy of the New Man in *Things to Come* can stand for dozens of similar speculations. In this film scientists defeat competing military and literary elites in their rise to power.

But after the bomb this theme rings false for many writers and readers. Of course even the Wells story reflected ambivalence about science, which provided the engines of destruction for the pointless wars that were finally to be ended in a world pacified by scientific reason. But the old fantasy of scientists and technicians in power is less convincing in a period when science and technique are increasingly integrated into the government apparatus in the race for the ultimate weapon. The government's reorganization of science testifies to the ambiguities of progress in the daily life of scientists. Science is already, if not in power, near enough to the centers of control so that its further participation in history no longer promises any liberation. The white knight of Reason turns out to be a cultured bureaucrat in Washington/Moscow.

These ambiguities resonated all too well with a very popular anti-scientific trend within science fiction itself. The bureaucratization of science is a mild form of a much more thorough bureaucratization of economic life in this period. It raises the specter of the technological obsolescence of man in a world of machines and mechanistic social organizations. Thematic material of this type is treated repeatedly from Capek's *R.U.R.* in 1920 down to the present. Before the War it is usually an anti-scientific conceit of literary intellectuals troubled by Nazi and Stalinist "totalitarianism." After the War, as Western democracies are increasingly recast in the bureaucratic mold it becomes a more and more popular theme of science fiction. Novels like Orwell's *1984* take up the pre-War elegy for humanistic values in a world of total administration.

What is at stake here is the destiny of man in a world based on scientific enlightenment. The issue is no longer simply the potential misuse of scientific discoveries for destructive purposes. These novels concern the fate of individualism in a scientized society. A whole genre develops based on the thesis that progress in power over nature and power over human beings go hand in hand. These "dystopias" (negative utopias) of totalitarian enlightenment represent reactions in the name of a humanism which admits its defeat in practice. It is the very success of science and technology in creating an integrated mass society that provokes a nostalgic backward glance toward lost freedoms. The isolated individualistic hero stands for the human values inevitably ground under foot by the march of history; to the triumphant positivist dystopia of these novels corresponds a lost humanistic utopia which is its spiritual *point d'honneur*.

The Cold War intensified the moral pathos of the structural changes in the organization of science noted earlier and sensitized scientists to the humanistic complaint. A tighter organization of science was not just a matter of efficiency but of loyalty as well. The "democracies" were fighting a ruthless opponent and could not afford soft-headed liberalism. The security problems to which Arthur Roberts jokingly

refers were deadly serious. Freedom was the watchword of the suppression of those who exercised it too carelessly: the defense of tolerance required measured intolerance.

This complicated the political prose of scientists as well as the metaphors of science fiction. Scientists were themselves suspect; only the expression of unconditional loyalty and obedience to Western ideals could allay public fears. In July, 1953 J.H. Van Vleck, retiring president of the American Physical Society, wrote in the *Bulletin of the Atomic Scientists*: "The list of physicist traitors is small, but the damage they can do is very great. We must bend every effort to see that such cases do not arise. Refusal to testify, granted it is a constitutional right, and unwillingness to state where one stands, are not calculated to win public confidence."

Yet the Enemy was hated and feared precisely because it demanded unconditional loyalty and obedience. Thus in this period every image of a society of total administration is simultaneously a denunciation of the Soviet Union and a more or less conscious expression of anxiety about the trend in the West itself.

As a result images on non-conformity and individualism are also ambiguous. On the one hand the scientists wish to defend their right to freedom of thought, which necessarily places them in a position of non-conformity with respect to the increasingly repressive society around them. As P.W. Bridgman said, also in the *Bulletin*, "The assumption of the right of society to impose a responsibility on the scientist which he does not desire obviously involves the acceptance of the third philosophy, that is, the right of the stupid to exploit the bright."

On the other hand most scientists accept the general ideological framework of the Cold War which rationalizes the demand for conformity and institutionalizes it, as far as science is concerned, in the new systems of security. Is the scientific non-conformist a Galileo, resisting totalitarian dogmatism, or is he a Joliot-Curie, defending such dogmatism against the advocates of freedom?

In the late forties and fifties there emerged an optimistic science fiction that attempts to resolve this contradiction. The threatening character of the trend in modern society is not ignored or minimized as in positivist utopias. Yet reason for hope is always found in spite of the apparently successful dissolution of the old forms of individualism.

It is as though the pressures of Cold War conformism and the bureaucratic reorganization of the scientific community force it to consider seriously the possibility that technology will indeed reduce men to mere tools of an inhuman, mechanical system. And yet to accept this conclusion would be to abandon all the ideological justifications of scientific activity, the whole notion of progress through enlightenment and power over nature. A solution must be proposed which takes into account humanism's nightmare while saving the dreams of enlightenment.

Jack Williamson's *The Humanoids* (1948, 1949) concerns the conquest of humanity by rather too benevolent robots programmed "To Serve and Obey and Guard Men from Harm." The humanoids engage in oppressive supervision of their charges and, in case of resistance, employ a drug therapy that destroys memory and personality both. The hero fights desperately to defeat the robots, witnesses his companions in struggle seized and transformed into automations by a "grid" in possession of the invaders, and is finally himself captured and processed. Awakening from a long sleep he discovers the truth: the robots really are saving the human race and preparing it to develop new powers. The hero is wholly reconciled to the new situation and a member of

the small group of humans who control the robots. The story works out well, man and machine reconciled, marching hand in mechanical hand toward some great dim destiny.

Asimov's *The Caves of Steel* (1953) depicts an over-populated world compressed by fear of open space into crowded cities. As robots replace workers, the mass of "declassified" laborers grows and hostility between men and machines reaches a violent peak. But in the end the problems are all solved and the policeman hero is even reconciled to his forced partnership with a robot. The robot explains that the goal toward which both humans and robots are evolving is a "C/Fe" culture: "The chemical symbols for the elements carbon and iron, Elijah. Carbon is the basis of human life and iron of robot life. It becomes easy to speak of C/Fe when you wish to express a culture that combines the best of the two on an equal but parallel basis."

Fred Hoyle's *Ossian's Ride* (1959) pits a scientist hero against a gigantic industrial-scientific corporation, suspected of evil intentions in spite of the useful products it has developed. The hero goes through harrowing adventures spying on the corporation but finally learns that its owners are benevolent visitors from another star system, come to earth to preserve the last remnants of their doo:sed culture. They will contribute through the corporation to the upward struggle of humanity and indeed of all intelligent life.

Novels like these can be understood as expressions of ambivalence within the scientific community about its own transformation and that of society at large. The technique employed is especially interesting. These novels are studied exercises in "generic discontinuities." The reader is already familiar with novels of totalitarian enlightenment such as *1984* and *Brave New World*. Williamson, Asimov and Hoyle plunge the reader into conflicts typical of this genre. But the conflict is finally dissolved in a surprise happy ending, contrary to all the pessimistic expectations awakened by the cliches of the man vs. machine narration. The fruits of enlightenment are saved from the critique by the optimistic conclusion, but not until the "misunderstanding" on which this critique is based has been lived, suffered and transcended.

Monsters from the Id

If the changed status of science is the product of a long-term trend which begins even before the War, the bomb focuses attention on this trend and sharpens the anxieties it produces. The stories discussed above promise mankind new powers in exchange for the harsh servitudes of modern life. But the existence of the bomb reminds the authors of the need for a higher responsibility in the exercise of these powers. The bomb brings science fiction face to face with the mortality of the human species.

The building of the bomb was the most blatant transformation of knowledge into power in human history. Those who accomplished this technical feat believed themselves uniquely qualified to govern its applications. They, at least, could understand that a turning point in the human adventure had been reached. A constant theme recurs in both serious essays on public policy by scientists and in science fiction. Knowledge of man has lagged behind knowledge of nature. The rift between the two explains the apocalyptic results of natural scientific inquiry. Man has the power; now he needs the wisdom to use it, even if he must surpass Newton in the discovery of new sciences and Socrates in the control of his own destructive impulses. The moment of

truth has arrived in which mankind will fulfill its highest potentialities or disappear like the dinosaurs.

Soon after the destruction of Hiroshima, these sentiments motivated scientists to call for the transcendence of national rivalries in a world government. In 1946 Oppenheimer spoke for the scientific community in arguing: "Many have said that without world government there could be no permanent peace, and that without peace there would be atomic warfare. I think one must agree with this."

But a suspicious and hostile public insisted on control of the process by which science gained access to policy making. The public saw the scientific community as a demonic force, untrustworthy and menacing. Frankenstein's experiments were child's play compared with this, and now gothic romance became mass consciousness. The scientists were, as Szilard complains at the beginning of "The Voice of the Dolphins", "on tap but not on top." Their political ambitions were suspect. They were perceived in terms of the dominant metaphors of science fiction itself as "aliens" whose intervention had interrupted the continuity of history.

To some extent these conflicts of image result in a polarization of science fiction. The "mad scientist" of the movies reaches his classic peak in the "philologist" of *Forbidden Planet* who wants to make mankind too wise and powerful for its own good, and dies of *hubris*. Scientists felt attacked by such caricatures which seemed to blame them not only for the discovery but its misuse, not only for the light of knowledge but for the "monsters from the id" which, in *Forbidden Planet*, govern its applications. The general public, however, was reassured by the moral of the film, that some things man was not meant to know, that our ignorance and weakness, our finitude, is safely guarded by our own inherent limits as a species.

Although science fiction representative of scientists' own views rejects this condensation of knowledge, power and evil in their person, it remains within the sorcerer's apprentice problematic of these movies. As scientists' hopes for disarmament and world government are disappointed, they too identify the source of the problem as "monsters from the id", the id of the crowd, of dictators, of politicians, in short, the irrationality of a human species too powerful for its own good.

The Humanoids sounds like an editorial from the *Bulletin of The Atomic Scientists* when it finally gets to the point:

" Technology had got out of step with mentality, the craggy man insisted. Don't you see? Technicians too busy to see. the tragic consequences were putting such toys as rhodomagnetic detonators in the hands of mental savages. I made the humanoids, to put an end to that. Such technicians as yourself--with the highest possible intentions-- had wrecked the balance of civilization, so that it was breaking up like an off-center flywheel. The humanoids simply made them take a holiday until the philosophers could restore a better equilibrium."

Asimov's most famous novel is built around this same theme. In the *Foundation* trilogy (1951-1953) Hari Seldon builds two planetary foundations to save something from the ruins of a dying galactic empire. The first is devoted to natural science, but it is destroyed by a mutant with a hypnotic power to mobilize in his service the irrational emotions of men. Then the second foundation, devoted to "psycho-history", intervenes and saves the day by taming the irrational forces which escaped the grasp of natural science.

In several novels by Arthur Clarke the problem is posed in terms of the ability of the human species to take its place in a universe of rational or even super-rational minds. *The City and the Stars* (1953, 1956) concerns an earth diminished by the false memory of titanic struggles with extra-terrestrial invaders. In reality, the earth was ravaged a billion years before by a "Mad Mind" of its own creating. The parallel with the unleashed forces of irrationality which destroy Asimov's first "Foundation" is striking. Humans no longer seek to go among the stars where formerly they were at home. Somewhat as in the *Foundation* trilogy, civilization is divided into two mutually indifferent cultures, one based on a perfect mechanical technology, the other on the mastery of psychic powers. Only through the union of these two cultures can mankind discover the truth of its past, overcome its fears and again participate in the great galactic adventure of Minds beyond imagining.

Walter Miller's *A Canticle for Leibowitz* (1959) is sometimes misunderstood as anti-scientific because of the Catholic trappings through which these themes are expressed. In fact, Miller says of science, "It was no curse, this knowledge, unless perverted by man..." His equivalent for the "monsters from the id" is original sin. It is not science but its periodic misuse by the idolized state in nuclear war which is the problem. As the novel ends the Church launches a space ship to preserve the sparks of both secular and sacred knowledge accumulated by mankind in its sojourn on an earth about to be incinerated once again. Human self-mastery is, however, beyond merely human power. Not a new science but an ancient wisdom promises mankind salvation and resurrection.

In all these novels the real life extrapolation of nuclear power to the limit calls forth a desperate reflection on the possibilities and need for a similar moral and mental extrapolation. Intelligence, as a hierarchy of forms that may well extend far beyond our present limits, is a key theme to which corresponds the projection of psychological capacities to the thermonuclear last degree. It is sometimes given to scientists to mediate personally between mankind and Mind as in *Ossian's Ride*. In other cases scientific discoveries mediate the transcendence of human limits, as in the Asimov and Clarke stories discussed above.

Science is thus placed in the traditional tragic position of mediator with the gods. This is a fantastic compensatory myth for guilt over the bomb and for the day to day reality of the subordination of science to political power, to bureaucratic organization and the security check.

History or Destiny

The overwhelming impact of the bomb on science fiction is to stimulate new speculations about the destiny of the human species and indeed of the universe itself. Giraudoux calls destiny "the accelerated force of time." Nothing has ever accelerated time like the atom bomb. In the bunker awaiting the explosion of the first nuclear device, Edward Teller calculates the probability of the bomb fusing the atmospheric hydrogen in a planetary holocaust. In the early days there is a strong conviction that nuclear war is coming and with it the end of history. The clock on the cover of the *Bulletin of the Atomic Scientists* moves ever nearer to the midnight hour of nuclear pan-destruction. And *this* science has wrought...

The end of history: science fiction is full of natural disasters of planetary scope. The sudden cooling of the sun, perturbations of the earth's rotation, the awakening of long frozen monsters from another era, all such catastrophic interventions of natural forces suspend the day to day conflicts which make up human history. Suddenly human energies must be mobilized beyond political rivalries in the interests of species survival. The bomb is a real example of such a typical technique of science fiction literature. It is a thought experiment become real in a striking imitation of art by life. It too seems to subordinate history to nature.

The novels discussed above are explicitly concerned with mankind's fitness to survive in a nuclear environment. Many contemporary stories approach this same question indirectly through space travel considered as a symbol of the transcendence of human limits. The symbol is well chosen: space travel can be made to serve a literary function similar to that of nuclear war.

The prospect of a galactic destiny gives a sense to the ideal of the oneness of the human species, as does the atom bomb. (Recall Tom Leher's "We'll all go together when we go.") Both devalue the traditional notions of historical victory and political power in the face of vaster goals. As Arthur Clarke put it, "the illusions of our day cannot survive the fierce, hard light that beats down from the stars." The same could be said of the very different "fierce, hard light" that first shone in the deserts of New Mexico. The planetary perspective is that of a viewer who knows the truth about the bomb, that it abolishes human history as such through the intervention in human affairs of natural forces out of all proportion to the size of nations and their petty political and strategic concerns. So too, rockets bring man face to face with destiny, which is beyond politics and national rivalries, which is essentially human and eternal, in a way that is structurally similar to the bomb.

Of course space travel had been treated before in science fiction. But the excitement lay in the conquest of space itself, the technical procedures, the astonishing discoveries of the first explorers. It was the adventure of lonely intelligence in the infinite spaces that so frightened poor Pascal. Stories like this continue to be written, but now they are old hat. The demystified space of the nuclear era requires new fantasies of exploration. As André Benedetto writes: "Il y a longtemps qu' on a cassé a double bang le silence éternel de ces espaces infinis..."

With the first rocket to the moon less than a generation away, the technical difficulties are all dismissed with a cursory mention of "atom drive" or "hyper-space". The interesting problems now concern man's moral fitness for space travel. Alfred Bester's *The Stars My Destination* (1956) concerns a future in which a trained individual can travel around the earth by teleportation. In a moment of desperation the hero, Gully Foyle, extends the range of "jaunting" to astronomical distances. He has discovered the secret of travel between the stars. But before his secret is known he gets involved in a complicated intrigue involving the loss and recovery of a new fissionable material that can be detonated directly by human thought. In the climax of the book Foyle distributes samples of the new element to people at random all over the world: not the politicians but ordinary people must choose between life and death, the stars and nuclear self-destruction. From atop the bronze head of Eros in Piccadilly Circus, he shouts to the crowd, "Die or live and be great. Blow yourselves to Christ gone or come and find me, Gully Foyle, and I make you great. I make you great. I give you the stars."

The dialectic of nuclear war and space travel could not be more clearly presented. The race to the stars is the moral equivalent for nuclear war, a domain in which the will to power can be sublimated in a socially positive manner.

In many other stories space travel is similarly treated as a test of human courage and wisdom, often in the face of irrational fears or prohibitions imposed by past generations or alien species. In Asimov's *Caves of Steel* the population problem can be solved by emigration to the stars once fear of open space and hatred of robots is conquered. Clarke's *The City and the Stars* is also about overcoming the fear of space. John D. MacDonald's *Wine of the Dreamers* and Theodore Sturgeon's *More Than Human* are two more novels that concern the conquest not of technical obstacles to space travel but moral obstacles. In all these stories the question is less one of technical mastery in the service of a Promethean destiny, than of space flight as a symbol of human self-mastery or self-transcendence.

Escape to Reality

The creation of the bomb traumatizes the scientific community by shattering its traditional self-image once and for all. Suddenly the detached and obsessive wise man of little science becomes the sorcerer's apprentice in thermonuclear power politics. As Robert Oppenheimer put it, "In some sort of crude sense which no vulgarity, no humour, no over-statement can quite extinguish, the physicists have known sin; and this is a knowledge which they cannot lose."

Beneath the endless litany of praise to science in the late forties and early fifties, praise designed to justify the expensive integration of research and government, lie seeds of self-doubt. All the changes in scientific life and self-consciousness described above prepare a critique of the ideology of enlightenment on which scientific activity has traditionally been based. The pursuit of power over nature through knowledge in the interest of survival and progress has reached an impasse.

At the end of the road to Bacon's New Atlantis lies not utopia but an insane world, heir to atavisms and social structures that drive men to produce and fight without respite in the midst of abundance. Modern technology has completed the work of history, has raised social labor to such high levels of productivity, has intertwined the fates of all peoples so thoroughly that the continued thralldom of mankind to political power and the struggle for existence has become an obvious absurdity.

In this context the question of the meaning of life is posed with new urgency. Surely several billion years of evolution and tens of thousands of human history are not for naught. There must be a point to it all, whether it be the transfiguration of the race as in *Childhood's End* or the production of a spare part for an alien space ship as in Vonnegut's *Sirens of Titan*. In any case the end of history provokes new reflections on its meaning as an essentially completed whole.

It is against this background that science fiction becomes a preoccupation and an occupation of increasing numbers of scientists. But it is also this background which subverts the traditional sensibility that shaped the forms of science fiction, preparing already in scattered works such as *Childhood's End* a deep mutation in the field. The writings of the "New Wave", of authors such as Ballard, Delaney, Phillip Dick and Ursula Leguin have little connection with the traditions that stem from Verne and Wells, Gernsback and Campbell.

The old fantasies about possible science and technology are increasingly replaced by new ones about religion, metaphysics, psychology and sociology. Often the older heritage of science fiction techniques--space drives, telepathy, etc.--is reduced to a mere collection of convenient devices without much intrinsic interest. By force of repetition technological exoticism has acquired the everydayness of the electric toaster. The old simplified novelistic form is attacked in new narrative experiments that reflect epistemological doubts and a sense of the contingency and fragility of the human individual. The traditional attempts to rationalize the speculations of the author give way to the self-confessed fabrication of new myths.

The earliest novels foreshadowing these changes were written in the period under consideration here in response to the new situation of science in the nuclear age. In these prophetic stories the atom bomb and space travel form the background to an apotheosis of the species. The Overmind of *Childhood's End*, the "lopers" of Simak's *City* are images of a total transfiguration of the human species beyond the realm of history. They are metaphors for the failure of enlightenment and the hope of a radically different future. Here the human form is cast off altogether and with it reason, mortality and responsibility. In these images the destiny of the human race is to become a sort of cosmic beatnik in flight from the intolerable burden of historical and individual existence. In them the human species does not transcend its limits, but rather the species itself is transcended.

Childhood's End (1953) begins with the U.S. and Russia about to conquer space: another step in the long march toward mutual conquest and destruction. Suddenly alien space ships appear over every major city. The "Overlords" have arrived to save mankind from its own folly. The human species is forbidden war and space travel, ("The stars are not for man") and eventually united in prosperity under a world government. A golden age of peace, leisure and creativity begins.

But all human hopes are cut short by a startling change in the children. More and more of them withdraw from reality into a dream world. The Overlords explain that above them all in the hierarchy of cosmic intelligence stands a being or pure mind which the children of humanity will now soon join. The history of the species is over. The Overlords have served not as masters but as midwives for the birth of some higher form of purely mental life.

The last surviving man witnesses the final transfiguration of what once were human children.

" So this, thought Jan, with a resignation that lay beyond all sadness, was the end of man. It was an end that no prophet had ever foreseen--an end that repudiated optimism and pessimism alike....

" There lay the Overmind, whatever it might be, bearing the same relation to man as man bore to amoeba. Potentially infinite, beyond mortality, how long had it been absorbing race after race as it spread across the stars? Did it too have desires, did it have goals it sensed dimly yet might never attain? Now it had drawn into its being all that the human race had ever achieved. This was not tragedy, but fulfillment. "

Simak's *City* (1952) moves toward a similar conclusion. The explorers of Jupiter employ a device which converts them into "lopers" capable of surviving on the surface of the planet. As it turns out it is much more fun being a loper than a man.

" He had found something greater than Man had ever known. A swifter, surer body. A sense of exhilaration, a deeper sense of life. A sharper mind. A world of beauty that even the dreamers of Earth had not yet imagined....

"Paradise! Heaven for the asking! And the end of humanity! The end of all the ideals and all the dreams of mankind, the end of the race itself."

Humanity deserts earth for Jupiter, leaving its old home to a race of intelligent dogs who narrate Simak's tale.

The concept of transfiguration in these novels revives some of the wildest dreams of 19th century utopianism: Fourier's reconciliation of man and nature; the young Marx's liberation of the senses; Kirilov's resurrection of nature in Dostoievsky's *The Devils*. Beyond the mere pacification of existence in an enlightened and rational social order--the goal of scientific enlightenment--appears a further horizon of joy and purposeless power, a Nietzschean transcendence of "the vermin man" and its humiliating divinities.

Why this recrudescence of romantic anti-rationalism in the very mainstream of a literature that always sought to rationalize the fantastic in the dreams of science? It is as though the failure of enlightenment as a social project also revealed the limits of scientific knowledge of nature. The modern concept of nature as an object of investigation and control is subordinated to an older idea of nature as a miraculous living thing of which man is a part. It is the return of *Naturphilosophie*, an outlook that could hardly be more alien to the tradition of science fiction up to this point.

A look backward confirms the depth of the change. Much earlier science fiction revolved around the poles of positivist optimism and humanist pessimism. In spite of this apparent opposition both tendencies anticipated the triumph of science, disagreeing only on the significance of the "brave new world" coming into being. In them history was portrayed as the destiny of Reason: which of the two sides of rationality would prevail, that which is dedicated to wisdom, to the intelligent choice of goals, or that dedicated to mere domination, to the ruthless control of means, including a robotized humanity?

The novels examined above respond to a quite different sensibility and problematic from that which inspired these classic forms. For Clarke and Simak science triumphs neither as wisdom nor as power. Traditional science fiction notions of progress are rejected, but so is the appeal to the individual against the mass, the humanities against science. This new fiction is an attempt to identify the limits of the species revealed by a dialectic of progress which promises certain self-destruction. It is an authentic expression of a hope (or fear) beyond the travail of history.

Is this escape from reality? In one sense it most certainly is. Science fiction announces the end of history while in India and China the liberation struggles of half of mankind echo in the background. Perhaps it is not history which ends with the bomb, but the West which withdraws from it in the face of rising struggles throughout the world. Yet this may be too facile a critique. For whatever the ambiguities of the results, the East certainly did not struggle simply to participate in the very sort of history against which it won its freedom, the history of national rivalries and oppression.

If this science fiction of self-transcendence is an escape, it is so in the manner of a flight forward toward the real. It shares the special trait of all good science fiction, the art of reminding us that the world of the present is a vanishing accident which must give way to a future as fantastic as any story. Science fiction can hardly be accused of

escapism for pointing out that the new threat to human survival signals the imminent disappearance of a world based on war and waste, competition and domination. We, or our near descendents, may well be those "last men" of whom Olaf Stapledon wrote already before the War. Nor need science fiction apologize for conceiving the inconceivable future in fantastic forms; nothing is more probable than the straight line extrapolation from the present into the beyond. The future will be qualitatively different from the present. Anticipatory realism, realism about the future, must therefore rely on the imagination.

This is not to say that this science fiction is a believable "literature of change" in the sense in which some authors and critics have described it. The science fiction of this period never rose to a historically concrete vision of its message. It was flawed at its roots by the self-delusions of the scientific and technical strata it represented. The fantastic form of these narratives of human self-transcendence testifies also to their weakness and futility. The critique of positivism they express was never more than a failed minor current in the thinking of a period when the expansion and growth of science gave new hope to scientists, if not to humanity. Still, compared with the old fantasies of Promethian triumph, the effort was a breakthrough toward a more humane sense of reality.

It is not clear what further role science fiction can play in developing a sensibility informed by the nuclear--now also environmental--age. History may be over in principle, in the sense that the old conflicts and ambitions must give way to a radically new type of human adventure or else the species will surely die. Nevertheless, in practice the unfinished work of history continues, indeed intensifies the very horrors and upward struggles that threaten survival and yet promise also a precious spark of light. Science fiction's lack of historical concreteness threatens it with silly irrationalism where it is insensitive to this ambiguity. Cheap despair and salvation alike shape the new cliches of an emerging literature of superstition, while many good authors are writing a fiction more "philosophical" than "scientific."

Asimov describes the science fiction of the thirties as an "escape to reality" because of its realistic anticipation of such things as atom bombs and television. Its near total abstraction from social issues cleared the ground for such anticipations. The lesson of the nuclear age is that no "escape to reality" is possible anymore by technological guesswork, however clever. In this period something snapped in the sub-structure of this literature. Henceforth it will be implicated in new ways in the very history it challenges. It is certain that science fiction, in the sense the term was used until the sixties, will be transformed by the change.