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Science: Revolutionary or Conservative?

ON LOOKING AT THE TITLE of this essay, readers of this journal of conservative persuasion might rush to the conclusion that science is conservative. But if, on the contrary, science is revolutionary, in what sense is it? Once this question is seriously considered, it will be the turn of liberals, sympathetic as a rule to revolutions, provided they take place at a safe distance, to feel concerned.

In politics the matter should be obvious. If a revolution takes place with relatively little bloodshed and if its opponents are promptly dislocated, either geographically or economically, it will quickly be taken for the ushering in of a new stability carefully to be conserved. Illustrations are both the "Glorious" Revolution of 1686 and the American Revolution. Even a flood of blood may appear a mere trickle from the distance of three or four generations. With another three or so generations gone, the perspectives of historians may even be readjusted to reality. "Revisionist" or rather plainly realist accounts of the French Revolution are already claiming a large share in the celebrations to begin in grand style on Bastille Day 1989. There and then kind words might be said of Marie Antoinette as a sensible woman defamed by nonsensical ideologues and victimized by a mob contemptuous of good manners.

It has for some time been a doubtfully sensible obligation for American presidents to send expressions of good wishes to Soviet leaders each November. The latter deserve credit for moving to November the October Revolution and do token justice thereby to science in general, and to the Gregorian calendar in particular. Few among the present leaders are old enough to be interrogated about complicity in Stalin's atrocities, well-prepared by Lenin's cold-blooded tactics. As China is desperately trying to catch up, after it had fallen ever farther behind during the Cultural Revolution, the West complies with studied disinterest in the twenty million or so victims of the most gigantic henchman ever to have carried the dignified title of Chairman.

That neither the Jacobins nor the Bolsheviks nor the Maoists achieved their aim of world domination is in no small measure due to their failure to spot the best in science, engage the best scientists, and secure thereby a superior technology. The backyard smelters of Chairman Mao did not produce steel, let alone computers. Soviet physicists could loosen up stifling Party control only from the 1950s on when Marxist ideologues began to see, at long last, revolutionary potential in the scientific revolution that had taken place earlier in the century. It remains largely academic, though tantalizingly so, to speculate about what would have happened if Napoleon had recognized early enough the genius of the older Carnot, a leader in applied mathematics, who during the Terror saved revolutionary France from collapse by remorselessly applying the guillotine as a remedy against wavering.

If public perception about the doubtful status of social or political revolutions is myopic, one should not bemoan the im-

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mense popularity of the term "scientific revolutions," a most doubtful idea, as will be seen shortly. There has never been an effective argument, however sound, against the popular tide. It is even hopeless to recall that a tide, if it is truly a tide, is bound to become an ebb. In that respect the Greek sages showed, although somewhat belatedly, more perceptiveness than their twentieth-century counterparts trying to appear "scientific." When Athens was at the zenith of its power, no Greek sage cared to discourse about an inevitable downturn of its fortunes. Greek power had to be gone for some time before Polybius consoled himself over the eventual downturn of the fortunes of Rome. According to Polybius the outcome was inevitable as the revolutions of stars and planets determined everything on earth.

The revolution in question was cyclic or recurrent. As such it could evoke what later came to be known as the wisdom of *plus ça change, plus ça reste la même chose*, a convenient shield from the specter of a drastic change that does away with the stones themselves after leaving no stones unturned. Nothing revolutionary in that latter sense was meant by Copernicus as he constructed his great system that made a "revolution" in the history of science. Almost all the stones Copernicus used were traditional. His most revolutionary notion about dynamics on a rotating earth was at least two hundred years old. More of this later. He saw nothing "revolutionary" in the shift from a well-ordered geocentric universe to a better-ordered heliocentric one.

Only two generations after Copernicus did his system begin to be equated with the sinistrous prospect of "all coherence gone" by precisely those—mostly divines and philosophers, or humanists in general—who did not really know what he meant. Actually, they were the ones who should have known the dubiousness of the term "revolution," taken for radical or total change. But when they needed most a modicum of philosophical acumen, they became contemptuous of it. Good old Aristotle, who took the right answer to the question of change for the cornerstone of the wisdom called philosophy, was never so much despised, or at least so poorly understood, as he was in the seventeenth century, the very century that saw science rise on the wings of heliocentrism. Aristotle's basic contention was that unless in change—any change for that matter—the starting and end points contain something basically common, they cannot be meaningfully correlated. He knew that elementary cohesion in intellectual discourse was at stake unless one talked intelligently, that is, coherently, about change in a world that could seem to contain nothing but change.

The Myth of Structureless Revolutions

With philosophy having largely divested itself of its touchstone of truth, philosophers looked in increasingly large numbers to science for answers to essentially philosophical questions. Thus terms that are typically scientific by use began to be taken for answers to questions that are essentially philosophical, among them a basic question about science. And since in this scientific age no one dares to admit a lack of understanding of widely used scientific terms, no questions are raised about "radical" change if it is offered as a "mutation" or "incommensurability." All seems to be becalmed on intellectual waters once the oil of scientific terms is poured on treacherous eddies which all the more merrily claim their countless victims. Many of them are the hapless undergraduates and graduate students who had no courageous teachers to tell them something very elementary about a circle and a square. Long before Einstein, Darwin, and Copernicus the circle and the square were known to be incommensurable. There is no squaring the circle, that is, to devise a method whereby a circle can be drawn with an area perfectly equal to the area of a square. For all that, no scientist has ever felt that to shift thinking from a square to a circle, or from a circle to a square, meant an intellectual mutation, a traumatic mental revolution, this last word standing for "radical" change, that is, for a change that uproots everything.

Most of those undergraduates and graduate students have also failed to learn about

the subtly contradictory character of the chief reinterpretation of science in terms of revolutions. For if revolution really means radical change, how can a structure, common to all revolutions, be recognized? No answer to this question is hinted at in T. S. Kuhn's *The Structure of Scientific Revolutions*, the foremost *must* in college book-lists in the 1960s and 1970s. It was from that book that countless students majoring in the humanities were expected to gain the real insight into science and from which almost as many science majors have unlearned the insight which their practice of science would have otherwise taught them about it.

It is most doubtful that more than a faint echo will be created in academia by a recent book that has for its subtitle, *Four Irrationalists*. Its author, D. Stone of the University of Sydney, named Kuhn as their chief. He rightly saw that Kuhn brought to a head that irrationalist program which Popper initiated in the guise of radical rationalism. Hence the main title of Stone's book, *Popper and after*, published by no less a prestigious firm than Pergamon Press.

Stone does not sound conservative. Liberals would rather welcome his logicism that allows no consideration of broader ideological factors and certainly not of those that relate to religion. In a sense he did with no holds barred what some of Kuhn's rationalist critics, liberal to a man, had merely hinted. For them the principal offense of Kuhn's book consisted in the threat it posed to the hallowed idea of scientific progress. That science is the only basis of progress, writ large, was a principal theme of all major documents of the Enlightenment. The phrase—all errors of man are the errors of physics—had found more than one spokesman in the wider entourage of Diderot before it figured thematically in Condorcet's famed program for public education commissioned by the Revolutionary government. A half a century or so later Herbert Spencer gave rhetorical ampleness to the claim that science represented the form of knowledge most worth having in every facet of life. Another half a century later the idea of progress became a notable victim of the war that first gained global reputation.

The religion of progress did not, however, lose all its devotees. Although World War I could not have claimed ten million dead and twenty million injured without the contributions of science, many rationalists still saw safety in the distinction between science and the use or rather abuse of the tools it provides. It was this, already beleaguered, notion of science that appeared to receive a fatal blow by the claim that science was but a chain of revolutionary changes. For as Kuhn's erstwhile rationalist critics clearly perceived, those changes could not constitute a cohesive sequence, a connective structure, if his basic contention was right. Kuhn himself tried subsequently to back off his original position, but never convincingly.

The Flouting of Reality

Widely read books are not always significant because of the arguments they offer, but because they reflect a climate of opinion. By the early 1960s a very clear shift in Western thinking was noticeable along a broad front. Thinking in terms of reality, truth, falsehood, and norms was rapidly losing its last shreds of respectability. The new thinking meant an unabashed endorsement of subjectivism. The stage has not, of course, been reached where one's individual experience can be flaunted as the last word to be respected by everyone else. After all the number of individuals was very large in 1960 and is twice as large today. But rank subjectivism quickly sidelined objective reality once it became enough for establishing "truth" to find a "statistically significant" number of individuals with similar "subjective" propensities. This last word may cover, without evoking the specter of intolerance, a multitude of sins as well.

Once the expression, "statistically significant," is given a cursory look, it will illustrate the truth of the dictum that statistics may be the biggest of all lies. The real reason for this is not that data can be (and all too often are) manipulated, which is bad enough. The statistical method presupposes fluctuations at least in our knowledge of data which may

be humbling enough but not catastrophic in itself. Catastrophe is, however, waiting in the wings when the fluctuations are ascribed to reality as such. The fickleness of human nature amply shows the reality of fluctuations, but it is not a good illustration for the purposes of science that cannot deal with human freedom as such, a chief source of those fluctuations. Few champions of absolute determinism have ever been consistent to the point of saying that they had not reached freely their conclusions about it. Science deals only with physical reality which can, of course, fluctuate though in only one sense: the mutual perturbances of physical entities, be they planets or gas molecules, have continually changing values. In the physical realm everything is always in motion which means change.

But can that change be a "revolution" or a radical upheaval? Can a physicist assume that Newton's three laws hold true in one moment, but not in the next, or are half-valid in this century, and hardly valid in the century to follow and fully valid for a half a century afterwards? Or can a physicist assume similar fluctuations about the speed of light? If the physicist were to do so, he would certainly go counter to the most absolutist foundations of Einstein's Relativity and to the countless experimental evidences on behalf of the absolute independence of the speed of light of the motion of its source.

Whereas few physicists are willing to consider the possibility of fluctuating values for the speed of light, most physicists have been for some time entertaining something far more daring, if not outright foolhardy. With a few exceptions, they have been wallowing for the past two generations in an elementary philosophical fallacy while taking it for good science. For it is an elementary fallacy, a patent *non-sequitur*, to claim that a physical interaction that cannot be measured exactly, cannot take place exactly. It is a flouting of plain logic to rush from a purely operational situation, the inability to measure certain interactions exactly, to a situation where interactions do not take place exactly. The latter inexactitude refers not to the quantitative aspects of things, but to the ontological reality of those very things.

If this elementary fallacy is ignored, one ushers in a world view in which all things, all processes, all perceptions are seen as resting on nothing, even if in place of the word "nothing" one uses the scientifically respectable word chance though it ultimately stands for nothing. One is in the presence here of the most radical flippancy conceivable: its object is no longer this or that fact, or situation, or custom, or belief, but the very ground of reality of existence.

It would be tempting to blame physicists for the emergence of this frightening prospect within which no coherence can be claimed by anything. For even if the prospect is merely a possibility, it would give priceless support to those who on other grounds have already claimed that there are no objective, let alone absolute truths and norms. The support is priceless because it is provided by that very enterprise, science, which commands the highest premium in modern culture. It is in this light that one should appraise the countless declarations of physicists that causality, which is the very clue to ontological coherence in a world of change, has been shown by quantum mechanics to have no basic validity. The same holds true of presentations, again by countless physicists, of the theory of relativity as a proof that everything is relative.

The real culprits are not physicists or scientists in general, but the philosophers. They should have been the ones to shout their heads off, a task for which they had, however, incapacitated themselves. Prior to the advent of relativity and quantum theory, the world of philosophy had only heads but no external and coherent things, that is, the kind of world which is called universe. For no external things forming an objective world but only minds thinking unto themselves were allowed to exist by Neo-Kantianism which ruled supreme in circles that still professed themselves to be philosophical. Philosophers with a sense for the real decided to appear as empiricist interpreters of science which was taken for an economical

correlation of sense data and not for a knowledge of objective reality.

The voice of the Neo-Thomist movement, which aimed at restoring a philosophy that does justice to the whole gamut of the real, from the plainly physical to the strictly metaphysical, was at most politely registered but not seriously taken into account. Worse, sometime before Neo-Thomism received its finest articulators in Gilson and Maritain, it had become infected by the deadly disease of transcendental Thomism, or the hapless effort to make Thomas relevant by grafting Kant onto him. There followed the systematic barring by phenomenology of metaphysical answers to metaphysical questions. The rest is known as the foundering of Roman Catholic thought on the shallows of sundry "experiences," with all their spokesmen setting themselves up as so many infallible oracles while fighting Infallibility.

Non-Catholic Christian, Jewish, and Muslim readers of this essay are invited to review parallel developments within their own theological ambience. The best ecumenism is the washing of one's own dirty linen in public and not of others' unsavory paraphernalia. Liberal Protestants may fruitfully concentrate on the fallacies of a Christian creed reduced to social gospel and to process philosophy. Liberal Jews may just as well reconsider a "Jewish" faith equated with comfortable living standards and dogmatic secularism. Muslims may take a close look at religious fervor whipped into suicidal fever in the name of piety. The aim of all these reconsiderations should, however, be the highlighting of the cacophony if not plain chaos, intellectual and social, that increasingly sets the tone of all public debate. If, furthermore, attention were paid to the "scientific" icing that gives intellectual glamor to an increasingly decomposing public cake, a most important truth would be on hand.

Science, Economy, and Politics

The truth in question is complex. Its least noticed aspect in some conservative circles is that science provides an increasingly large part of the public and private cake. Almost completely gone are the days when accidental moves, such as the lucky striking of oil in Pennsylvania, changed the course of economy. Gone, though not entirely, are the days when a small though determined group of engineers could do the same to the economy by finding answers to long elusive technical problems by procedures that would hardly qualify today as scientific. There was little science in Charles Kettering's dogged pursuit of knock-free gasoline and of electric self-starters, both of which were indispensable for speedier and practical cars. Similarly "non-scientific" was the discovery only two years ago of superconductivity at temperatures well above absolute zero. It came after several years of trial-and-error work by two physicists who gained the Nobel Prize with lightning speed. Such acquisitions, however well merited, of Nobel Prizes in physics are becoming almost as scarce as hens' teeth.

Quite scientific or systematic is the effort already in high gear to exploit the potentialities of superconductivity, both technologically and commercially. The results are expected to bring about far greater economic changes than was the case with semiconductors introduced in the early 1950s, or even with printed circuits and microchips, to say nothing of the electronic tubes that were the chief means of the industrial revolution between the two World Wars. Solid state physics and physical chemistry have for the last three or four decades made possible the production of materials with fantastic properties that hardly ever lacked enormous sales potential. The science of genetics is putting unexpected new tools at the disposal of the meat industry, recent European protests notwithstanding. Without science, food production and its marketing would have long ago been stalled at a rather low effectiveness.

Science is certainly revolutionary in its effects on national and private economy and will be even more so as time goes on. As such, science is also the source of social dislocations that have a "revolutionary" poten-

tial in a political sense. At an accelerated rate standard jobs are becoming obsolete which makes retraining an ever more pressing social task. A most telling aspect of this is the recent ferment called *glasnost* in the Soviet Union. It would be a mistake to think that openness (*glasnost*) is now endorsed by a chronically closed political system as if it had suddenly developed a taste for freedom typical of Western democracies. The real reason for the call for *glasnost* is the realization in ruling Soviet circles that they are beaten at their own game in which technology and economics were to decide the issue of global domination.

According to the rule of that game, as conceived within Marxism, the tools of production determine the outcome of political struggle and history. While this theory is basically false, it has a partial validity to a much greater degree than would be allowed by many conservatives and liberals in the West. They should not readily forget some salient lessons of World Wars I and II. In the former the discovery by Fritz Haber (a Nobel-laureate chemist) of synthetic phosphate enabled Germany to carry on long after it had been cut off from natural phosphate deposits in Chile. Quite similar was the impact during World War II of the German discovery of producing gasoline from coal. On the other hand the Germans' failure to produce oil that did not freeze in the cold Russian winter made it impossible for them to capture Moscow in late 1942. Just as crucial was the development of radar for Allied victory. The maintaining of peace (and the Soviet option for *glasnost*) may owe much to the development, recently disclosed, of a new American bomber undetectable by radar as well as to the inability of all Marxist countries to provide telephones in large numbers without which computer-processed information and productivity remain a lame duck.

The push for *glasnost* will quickly reveal its true motivation once seen in the light of the Bolshevik revolution that failed to fuel a scientific revolution. The Soviet Union, well behind in advanced military technology, is desperately behind in a technology which is commonplace in civilian life in the Western world and is propelling its accelerated transformations. *Glasnost* is a cover-up for the fact that in order to save its political revolution, the Soviet system has to transplant on its soil the sequence of scientific and technological revolutions that proved to be accelerating in the West. Science has not achieved a potentially greater political revolution than it did by taming that very movement, Marxism, which claims itself to be the revolutionary ideology *par excellence* because of its allegedly "scientific" character.

An additional paradoxical feature of all this is that the scientifically revolutionary West is socially conservative in comparison with an East which is all too often revolutionary in a radical sense though rigidly conservative in some other respects. This would hardly be the case if science were revolutionary in a radical sense. Science is like an ocean: the waves on its surface never come to rest and at times are whipped high by violent storms, yet the ocean remains supremely quiet in its very depth. A glimpse of the applicability of this to science may be caught in Copernicus's traditionalism, in the various non-random parameters of quantum mechanics, and in the shabby logic of the dictum (very absolutist in itself) that everything is relative.

Conservatism in Science

Behind Copernicus's traditionalism or conservatism, an attitude of steadiness, lay his espousal of the conceivably steadiest world view. Couched as the latter is in an apparently childish creation story, it bespeaks of a universe that has to be steady, that is consistent, because it is the product of One, the Creator, who is consistency by definition. The universe of biblical revelation and of Christian creed is not steeped, unlike the pagan or Greek cosmos, in unspecified immensities, but set on a most specific course by its being created out of nothing and in time. This is why Copernicus went about with supreme calm over that apparently most revolutionary act, the removal of the earth from the center of the universe. The

new position of the earth merely revealed to Copernicus a better view about the universe which, as designed by the Creator, had to be fundamentally steady even as man's perception about it undergoes "revolutions."

Another aspect of the conservative steadiness of Copernicus is revealed by his matter-of-fact recourse to the impetus theory as a solution to the problem of why everything remains fixed or "normal" on the surface of a fast rotating and even faster orbiting earth. The impetus theory, two hundred years old by Copernicus's time, grew from direct reflections on the Christian dogma of creation in time. The dogma is indicative of a sovereign act of the Creator who sets thereby a unique frame of reference to any and all events, physical and historical. Hence the steadiness and confidence inspired by belief in that act which in this scientific age may best commend itself by being the inspiration for Buridan to speak around 1330 about the beginning and continuation of cosmic motion in terms that anticipated Newton's first law of motion.

After heliocentrism the next greatest scientific revolution was quantum theory about which it has been widely claimed for the past two generations that it deprived existence of steadiness, the very basis of conservatism. The true merits of that claim which, as was already noted, rests on fallacious reasoning, are best seen in its full unfoldings. Among the latter are such views that photons must communicate with one another (as if they were living beings) and that universes arise out of nothing through purely random processes provided the scientist writes the proper equations. Such views, which do not fail to bring home the erroneous character of certain starting points, reveal a most important feature of science. While it may momentarily encourage "revolutionary" and perhaps apparently "nonsensical" ideas, in the long run science forces upon its cultivators a return to viewpoints that have always been associated with "normalcy." Thus no sooner had the "innumerable" universes of the inflationary theory appeared on the scene, than desperate efforts were under way to secure the coherence of those universes into one single universe. Such is a roundabout reassertion of normalcy by most "revolutionary" minds as they surrender to the logic that as long as one takes the word universe in its normal meaning it can only designate a single entity.

The revolutionary or inconsistent world view of quantum mechanics, or rather of its Copenhagen interpretation which is philosophy above all and not science, has its chief opposition in relativity theory. The reason for this is that the world view underlying relativity theory is conservative in the best sense. According to that view the basic laws of physics will retain, precisely because of their basic character, their form regardless of the reference system to which they are related. Beneath the sameness of form (in itself a vote on behalf of a fundamental conservatism) there lies a philosophical vote (certainly cast by Einstein) on behalf of the fully objective character of physical reality and of the entire physical universe. Objectivity too, needless to say, is more akin to conservatism than to a liberalism bent on endless "reforms," so many pretexts for doing away with universally valid principles and permanent patterns, which are the hallmarks of conservatism.

In sum, science is profoundly conservative because its best principles and inner logic refocus attention, even if at times only in the long run, on an objective physical reality consistent in all its workings. Science does so to the extent of even giving unexpected support to the cosmological argument about the existence of God. That argument, never to the liking of liberals, let alone of libertines bent on institutionalizing endless revolutions, is the ultimate solid basis of conservatism. Of course, the conservatism in question is not a jealous safeguarding of an all-too-often unjust social status quo within which religion is supported only because it may opiate the dispossessed. The conservatism in question is a dedication to keeping intact basic perceptions even if that calls for great personal sacrifices or at least for a genuinely altruistic stance.

Liberals and Science

True conservatism is therefore the very opposite to nostalgia for the past. At a time when science changes living patterns, communication, information processing, and tools of production at a mind-boggling rate, conservatives must make the most of the support they can find in science. They must carefully ponder what science is truly about in order to take the wind out of the sails of pseudoliberals who all too often succeed in packaging their program in specious references to science. They are wont to present their ready accommodations with trendiness as a scientific stance as if science supported the view that there are but shifting patterns. It is on that ground that they advocate the convenient replacement of principles with patterns, of norms with varieties of behavior, of truths with opinion polls, and, last but not least, of liberty with a libertinism ready to compromise the freedom of countless others in order to secure the laissez-faire of a relatively few.

Against this kind of liberalism the one professed by most of the founding fathers should seem arch-conservatism. Undoubtedly, the founding fathers sought support in the science of their times for several of their politico-social views. A case in point is Jefferson, possibly the most universally learned man in the newly-born United States. His stature as a polyhistor received its most graphic and facetious portrayal when President Kennedy reminded fifty or so American Nobel laureates at a dinner in the White House that it contained more talent only when Jefferson dined there alone.

Jefferson supported the separation of political power into three branches and their careful balancing with a comparison to the equilibrium prevailing in the solar system. (Metternich, a younger contemporary of Jefferson and a chief architect of nineteenth-century European stability, traveled with a copy of Laplace's popular book on the system of planets in which much was made of their stability). The comparison, which antedated Jefferson, had to be well known to other Founding Fathers as well. But whatever their sympathy for science, which even then could easily parade as equivalent to all reason, they would not have thought of deriving from science the principle in which they saw the very foundation of human liberty and dignity.

Historically, the matter should seem to be beyond doubt. Otherwise, James Reston, a leading liberal columnist of our time, would not have warned against a heedless liberalization of our relations with the Soviet Union. He did so by pointing out a basic difference between the Soviet Union and the United States. He traced that difference to the fact that the Founding Fathers saw in the immortality of the soul the sole ground for the individual's inalienable dignity (*New York Times*, April 22, 1984, E15).

Such a ground can, of course, be advocated in terms of a philosophy which conservatives can readily profess, whereas it is rather difficult to reconcile with most liberal ideologies and is absolutely incompatible with revolutionary propaganda. The latter stops with the first phase of what fermentation does to grape juice as its surface is filled with unseemly dregs and opaque bubbles exuding unsavory odors. By barring the road to maturation revolutionary propaganda effects a permanent split in the society or nation enveloped by it.

Science and Three Revolutions

The Jacobins boasted of being scientific and they counted among themselves d'Alembert, Condorcet, and Bailly, to name only a few prominent men of science ready to reorganize society. Tragically enough for France, these men nurtured as much an unjustified view of science as they were unjustified in declaring the *ancien régime* with its very ancient roots to be an entity of which nothing was worth retaining. This was an opposition between all or nothing, the same opposition which they saw between the times after Newton's century and all centuries before. Their view of science was that of a complete novelty suddenly arising on the scene. In fact they were the first to speak about a *revolution* in science, brought

about by the work of Galileo and Newton.

The French scientific social experiment, symbolized by Bastille Day, is much talked about nowadays in view of its bicentenary in 1989. Few are the authors who either praise sky-high a venture that logically led to the Terror or reject it as something that has nothing in its credit column. The prevailing tone is very different from the one that greeted the first centenary of Bastille Day in the euphoria of the newly-born Third Republic, proud of its scientific orientation. The actual tone is rather subdued. Too many in France have become aware of their having been split, as if beyond repair, into two factions that can at best look forward to an uneasy truce but not to a lasting reconciliation.

That this happened in France and with ample references to science is particularly ironical. What has already been said about the medieval origins of modern science, or at least of that all-important first among Newton's three laws of motion, should suggest something of the particulars of that irony. The impetus theory saw birth in early fourteenth-century Sorbonne, as much a chief pride of early French national identity as it was a principal bastion of Catholic orthodoxy. Inasmuch as French spokesmen of rationalism and enlightenment wanted no *gloire* if it was associated with orthodoxy, they cut themselves off from that aspect of pre-rationalist French past that was most portentous of a scientific future. Even a century after the first Bastille Day, and in fact even today, secularist France finds it very difficult to do justice to Pierre Duhem (1861-1916) who singlehandedly and heroically unearthed through dozens of heavy volumes the medieval and mostly French origins of modern science. French *gloire* is not eagerly embraced in many parts of France if it is also Christian and Catholic glory.

Nothing could be more tempting at this point than to invoke the English and American experiment. On the face of it, the Glorious Revolution of 1688 was not a radical break with the past. A hundred years later it produced no less a spokesman of conservatism than Edmund Burke. But Burke, who in his "Reflections on the French Revolution" rightly deplored the replacement of the age of chivalry with the age of calculators, is read and approved in a very selective manner today. Very few in the actual Tory establishment (to say nothing of Laborites, Liberals, and Social Democrats) would endorse Burke's firm commitment to basic, unchangeable truths and norms about man and society. Indeed the British soul is as much in a state of split as is the French, but with a difference. In France the split divides the nation into almost equal halves, whereas in England the resulting parts are very unequal. The religious half of France still can put up a formidable barrier to the juggernaut of secularism, whereas the traditional or "established" representation of Christianity in Britain is approaching the status of a negligible quantity. The process is largely propelled by a "liberal" caving in of Anglican divines to the dictates of a "science" which they are unable to distinguish from trendiness in scientific garb. In their circles truth has become a matter of counting opinion polls, a reflection of ever-shifting patterns.

Much the same is true about America. There the Revolution took place on a practically virgin soil, the field of enlightened reason, which was believed to be fertile enough to nurture indispensable truths. Foremost among them was that all men are created equal and insofar as they are created they have an immortal dignity vested in their very souls. The soil was not so virgin. In two hundred years American society has largely yielded to the lure of a "liberal" science, implying the equivalence of all patterns, provided they are patterns, that is, behaviors practiced by statistically "significant" groups. Natural religion once more turned out to be impotent to cope with the temptation of a natural science divested of its true nature. No wonder that only in religious circles, where in spite of cultural pressures the supernatural is still taken seriously, is the natural dignity of man more than a mere slogan.

Science Program for Conservatives

True conservatives dismayed by the runaway paganization of American life still have to see its chief "intellectual" justification. The latter comes from taking science for a mere accounting of patterns, always "liberally" pullulant. Such a misinterpretation of science would not be so effective were not science something far deeper than it appears to be. The unquestioning premium put on the label scientific is in fact an evidence, as well as an abuse, of what science is truly about. Science is not so much a tool for pragmatist success as revolutionary liberals would have it, but a particularly cohesive repository of truths about the physical universe. Even when they are improved, those truths keep conserving genuine former attainments. This is why scientific laws are known today to span staggeringly immense orders of magnitude. Only in this century that span extended from twenty to almost forty orders of magnitude as science, after conquering the world of the atom, penetrated that of the nucleus and reached twenty thousand times farther in space than the confines of the Milky Way. Even greater was the advance of science as it pushed farther back into the past of the universe.

Major steps in such advances are usually described as so many revolutions although their true nature is exactly the opposite. But to see this one has to gain a depth of view about science. Even more importantly, the upcoming generation, markedly conservative mainly because it sees under its very eyes the disintegration (physical and moral) of its older brothers and sisters, must be carefully informed and instructed about science. They are to be enlightened about the distortions, so popular in the academic world, of science as a chain of intellectual revolutions, of conceptual mutations, of isolated paradigms, of competing theories, of arbitrary research themes and the like. They are to be enlightened about the pitfalls opening up under their very feet when they applaud prominent free-market theorists who offer their ideas in precisely those pseudo-scientific terms. They are to be enlightened about the fact that for the past thirty years the teaching of the history and philosophy of science has largely replaced the study of classics as the matrix of cultural formation. The latter shift is not to be taken for an unqualified bonus, though for much more than a mere registering of a fact. Nothing is more un-conservative than a bucolic diffidence for, let alone a crypto-Manichean disgust of, science and technology.

For better or for worse science has become the universal currency of modern culture. Scientific terms are tokens of success in all fields of life. Anything bad can safely parade once dressed in scientific garments, phoney as they may be. The good certainly can profit by some scientific-looking paraphernalia if its cultural appeal is to increase markedly. There is for conservatives a program which demands that they perceive the conservative roots and nature of science. The stakes are far greater than the health of the conservative movement. At stake is the very health of society in which many are swept up in a merry march toward an anarchical state of affairs. There chaos will rule through the cult of "scientific" patterns that are often but statistical data about decadent behavior and warped reasoning. A hundred years ago there was still enough cultural sensibility to see the dangers of *l'art pour l'art*. It is to be seen whether there is still enough sense to spot the seeds of ultimate dissolution in the cult of *patterns for patterns' sake*. If there is, not only society but science too will be conserved, that is, secured for an enduring purpose.

For a wider discussion of the main points in this essay relating to the history and philosophy of science, see chap. 15 in my Gifford Lectures, *The Road of Science and the Ways to God* (Chicago: University of Chicago Press, 1978 and paperback reprints), chap. 1 and 12 in my *Chance or Reality and Other Essays* (Lanham, Md: University Press of America and Intercollegiate Studies Institute, 1986), and chap. 1 in *The Absolute beneath the Relative and Other Essays* (Lanham, Md: University Press of America and Intercollegiate Studies Institute, 1988).