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Source: *Journal of the History of Ideas*, Vol. 10, No. 3 (Jun., 1949), pp. 374-398

Published by: [University of Pennsylvania Press](#)

Stable URL: <http://www.jstor.org/stable/2707043>

Accessed: 09/05/2013 17:01

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# THE SOCIAL RESPONSIBILITIES OF SCIENCE IN *UTOPIA, NEW ATLANTIS AND AFTER*

BY ROBERT P. ADAMS

## I

The crisis in contemporary civilization, expressed in two world wars, has a parallel in a crisis of dynamic ideas which have had far-reaching influence since the Renaissance. The terms "utopianism" and "utopian progress" are used to express the concept that men are capable of advancing slowly in a positive and desirable direction, that this progress can continue indefinitely in time and is within the control of man rather than dependent on Providence or any external will; and that ultimately, as J. B. Bury wrote, ". . . a condition of general happiness will . . . be enjoyed, which will justify the whole process of civilization."<sup>1</sup> Utopianism itself, reasoned Mr. Lewis Mumford, is made up of two main ideas which have largely governed the social thinking of liberal, humanitarian groups in the west for the past two hundred years. The first of these elements is the belief in an endless scientific and mechanical progress, plus the idea that material progress is somehow positively related to moral progress, the two being as it were handcuffed together. The second part of utopianism is the belief in human rationality, at bottom a belief in human goodness, which holds that the world is ripe for a sudden transformation which should establish peace and justice forever.<sup>2</sup>

Oscar Wilde expressed, not an original view of modern history, but one increasingly held by educated men until quite recently, when he wrote:

A map of the world that does not include Utopia is not even worth glancing at, for it leaves out the one country at which Humanity is always landing. And when Humanity lands there, it looks out, and, seeing a better country, sets sail. Progress is the realization of Utopias.<sup>3</sup>

It is fairly obvious, however, that to launch the ship of modern progress and to set its sails for utopia, required not only the machinery and navigational techniques discovered by the "new"

<sup>1</sup> J. B. Bury, *The Idea of Progress* . . . (London, 1920), 5.

<sup>2</sup> Lewis Mumford, "The Aftermath of Utopianism," *Values for Survival* (New York, [1946]), 61-77.

<sup>3</sup> *The Soul of Man Under Socialism* (New York, [n. d.]), 16.

science of the Renaissance and after, but required above all creation of the humanistic concept of utopia itself.

The idea that applied natural science can be made responsible for remarkable social progress was advanced by Sir Thomas More in his narrative of the imaginary state of Utopia (Book II of *Utopia*, 1516) and by Sir Francis Bacon in his fictional *New Atlantis* (1627) and in related works. The aim of this paper is to compare the utopianism found in these so-called "ideal commonwealths," and finally to suggest a few typical attitudes of some leading contemporary scientists and their critics toward the prospects for utopian social advance through science in the foreseeable future.

## II

The idea of utopian progress could not have been conceived, or taken seriously as setting an attainable future goal for society, until several ancient and formidable cultural traditions had been at least partly overcome. The first of these was the persistent belief that the world was in its senile dotage and man degenerate, that the Golden Age occurred long ago and that the end of the world was imminent, all of which contributed to a heavy pessimism about man's future which pervaded much Renaissance thought about man's place in the universe.<sup>4</sup>

In the second place, before natural science could be advanced as an instrument of social progress, there had to be a "rehabilitation of nature." For all time it had to be proved that the experimental study of natural phenomena was not a criminal probing into a realm of "forbidden" and Mephistophelean knowledge which leads to diabolism or atheism, as with Marlowe's *Doctor Faustus*. With this mighty work, the name of Sir Francis Bacon and the *Advancement of Learning* will, of course, always be associated, although, as Professor Willey pointed out, Sir Thomas More advanced the same essential argument a century earlier, in the *Utopia*, where "natural philosophy is considered, not as 'conjuring,' in-

<sup>4</sup> See Richard F. Jones, *Ancients and Moderns . . .* (St. Louis, 1936), 23-42; George Williamson, "Mutability, Decay, and Seventeenth-Century Melancholy," *English Literary History*, II (1935), 121-151; Don C. Allen, "The Degeneration of Man and Renaissance Pessimism," *Studies in Philology*, XXV (1938), 202-227; Arnold Williams, "A Note on Pessimism in the Renaissance," *Studies in Philology*, XXXVI (1939), 243-246.

volved a pact like that of Faust and Mephistopheles, but as something acceptable to God, and even as a part of religious duty.”<sup>5</sup>

Third, a new and dynamic conception of human happiness had to appear, gradually to replace the static idea of older cultures, illustrated, for instance, in the last cantos of Dante’s *Divina Commedia*, which represent supreme bliss as contemplation and love, combined at the highest intensity but with perfection achieved and nothing remaining to strive for. The same idea appears in the conception of heaven in Milton’s “At a Solemn Music:”

Where the bright seraphim in burning row  
Their loud uplifted angel trumpets blow,  
And the cherubic host in thousand quires  
Touch their immortal harps of golden wires.

“It is not suggested,” wrote Mr. Bertrand Russell drily of this passage, “that the trumpets and harps should be of continually improved makes, or should be played by machinery to save the angels trouble or to leave them free to increase the height of the buildings in the Golden City.”<sup>6</sup> Finally, man had to arrive at the conception, as represented in *Utopia*, that the problems of existence on earth are in man’s own hands for solution, and not in those of Providence.

All four of these pre-requisites for an idea of utopian progress were represented in the Utopian state by Thomas More a century before Bacon set out his sumptuous vision of science’s power to improve man’s lot on earth. It is less surprising than it may seem that More’s accomplishment has usually been overlooked, for, as the late R. W. Chambers wrote, “few books have been more misunderstood than *Utopia*.”<sup>7</sup> Thanks to the criticism of Professor Chambers and others, however, a coherent understanding of the unified purposes of More’s satire is now possible. Furthermore, Professor Francis R. Johnson has established that “most of the fruitful ideals of science” that are usually associated with Bacon’s work, including the “enthusiastic belief in future progress through the advancement of science,” were part of the “publicly avowed creed” of English scientists between 1550 and 1600.”<sup>8</sup> In short,

<sup>5</sup> Sir Thomas More, *The Utopia*, ed. J. H. Lupton (Oxford, 1895), 217; Basil Willey, *The Seventeenth Century Background . . .* (London, 1934), 35.

<sup>6</sup> “Science,” *Whither Mankind . . .*, ed. Charles A. Beard (New York, 1928), 73.

<sup>7</sup> R. W. Chambers, *Thomas More* (New York, 1935), 125.

<sup>8</sup> *Astronomical Thought in Renaissance England . . . 1500-1645* (Baltimore,

there was considerable preparation of the intellectual climate for an idea of progress before Bacon's time.<sup>9</sup>

In More's fictional state of Utopia (set forth principally in Book II) what are the basic ideas which are commonly held as to the purposes and uses of natural philosophy or science, and how are these related to the idea of utopian progress?<sup>10</sup> A century before Bacon, More (although of course not the first to do so) advanced the argument that natural philosophy was to be considered, not as a form of evil and anti-religious "conjuring," but as something acceptable to God, a part of religious duty, and an essential instrument of social advance.

This basic attitude of the Utopian citizens (not necessarily of More himself) appeared in several ways: first, in a key passage on the relation of science to the Utopian philosophy; and, second, in this philosophy as a whole as it is set forth, partly by exposition but mainly as exemplified throughout the picture of the Utopian commonwealth by the accepted ways of life, since it is through social action that the Utopians "realize" their ideas.

Although in the passage which is given below, More began by thinking of "Phisick" (i.e. medicine, *res medica* in the Latin), I agree with the best editor of the *Utopia*, Mr. J. H. Lupton, that "in what follows More is plainly thinking of physical, or natural, science in general."<sup>11</sup>

For thoughe there be almost no nation vnder heauen that hath lesse nede of Phisick then they, yet, this notwithstanding, Phisicke is no where in greater honour; bycause they count the knowledge of yt emonge the goodlieste, and mooste profytable partes of Philosophie. For whyles they by the helpe of thys Philosophie searche owte the secrete mysteres of nature, they thynke that they not onlye receaue therby wonderfull greate pleasur,

1937), 296; cf. also Edgar Zilsel, "The Genesis of the Concept of Scientific Progress," *Journal of the History of Ideas*, VI (1945), 325-349.

<sup>9</sup> On social criticism in the "commonwealth tradition" after More's time, see Helen C. White, *Social Criticism in Popular Religious Literature of the Sixteenth Century* (New York, 1944), 41-48.

<sup>10</sup> The outlines and principles of the Utopian philosophy as a whole, as referred to in the discussion following, are given in two earlier articles by the writer: "The Philosophic Unity of More's *Utopia*," *Studies in Philology*, XXXVIII (1941), 45-65; and *ibid.*, "Designs by More and Erasmus for a New Social Order," *Studies in Philology* XLII (1945), 131-145. See also R. W. Chambers, *op. cit.*, 121-131; H. C. White, *op. cit.*, 42-59.

<sup>11</sup> *Utopia*, ed. Lupton, 217 note.

but also obteyn great thankes and fauour of the auctoure and maker therof. Whome they thynke, accordynge to the fassyon of other artyfycers, to haue sett furthe the maruelous and gorgious frame of the worlde for man to beholde; whome onelye [i.e. man] he hathe made of wytte and capacitye to consydre and vnderstand the excellencye of so greate a woorke. And therefore, say they, dothe he bears more good wyll and loue to the curyous and diligent beholder and vewere of his woorke, and maruelour at the same, then he [God or nature] doth to him, whyche lyke a very beaste wythowte wytte and reason, or as one wythowte sense or mouynge, hath no regarde to soo greate and soo wonderfull a spectacle.<sup>12</sup>

To be fully intelligible, however, this passage and its implications must be understood as related to the whole Utopian philosophy and to Utopian social practices. The citizens sought through their developed powers of observation and reasoning to comprehend the “secret mysteries of nature” (i.e. of *everything*). They were not content to admire and to contemplate the universe as a work of art. Rather they tried to understand the workings of nature, and the attitude apparent in the quoted passage was regularly employed in a ceaseless effort to understand what was “according to nature” in every phase of human life and of the natural environment. The knowledge thus gained the Utopians then proceeded to apply to the solution of the practical problems of enhancing human welfare throughout the commonwealth. That is, their prime concern was to discover how to effect social progress, through directing reasoning taken from what is called nowadays the field of “natural” science to the solution of problems lying largely in the field now termed “social” science.

It must be remembered that in his satire More aimed to show how “enlightened and righteous heathen, . . . heathen philosophers, and, as such, guided solely by the light of reason,” ought to behave.<sup>13</sup> Broadly speaking, the Utopians expected happiness to result from living rationally “according to nature.” Such a way of life would, of course, be impossible if the essential *modus operandi* of the universe could not be grasped by man by means of reasoning upon his observations. It will be worthwhile at this point to review the Utopians’ assumptions about man’s relation to the natural universe. To these rational philosophers every aspect of the universe represented the orderly working-out in cause-and-

<sup>12</sup> *Ibid.*, 217–218.

<sup>13</sup> Chambers, *op. cit.*, 226–227; Adams, *op. cit.* (1941), 49.



effect patterns of the power of one "nature" or God, evident to man as everlasting creativeness united with and tending to produce virtue (i.e. good, or harmony between the parts of the universe).<sup>14</sup> Not only does the whole of creation (including of course man throughout history) operate in regular, predictable ways, but the Utopians further assumed that nature had endowed man (as contrasted with the animals) with powers of reason which, if healthily developed, enabled man to comprehend nature's modes of working.<sup>15</sup>

Since the universe, without exceptions, was assumed to operate lawfully "according to nature," and since each created element was assumed to have been equipped by nature to achieve harmony with the natural order, the Utopians logically assumed that "nature" had endowed man with the capacity for a harmonious adjustment with his fellows and with his environment. In short, man has the capacity for a life "according to nature,"<sup>16</sup> which is to say a capacity for a good and happy life. If happiness was defined as the result of those rational decisions and actions by which man was brought into agreement with natural law, it obviously followed that wretchedness (apart from that incidental to certain fixed limitations on life, such as the necessity of death) must inevitably come to those men who wilfully or blunderingly attempted to live contrary to nature. In fact the Utopians considered that the major social ills from which European-like society chronically suffered (such as needless poverty, crime, and war) were essentially man-made and were rightly to be viewed as the total result of many actions by men who had become irrational and corrupt, who hence—either intentionally or otherwise—sought to run contrary to nature, but who (together with the society involved) necessarily could not escape the ensuing social pain or catastrophe.<sup>17</sup>

While it is technically true that natural science as Bacon conceived it scarcely existed in More's day, the Utopians are represented as employing fundamental viewpoints and critiques from which natural science later developed. For their concept of the universe contained, and their collective social practice embodied, what I take to be the germinal idea of modern applied science,

<sup>14</sup> *Utopia*, ed. Lupton, 266-267; Adams, *op. cit.* (1941), 51-52.

<sup>15</sup> *Utopia*, ed. *cit.*, 218; Adams, *ibid.*, 54.

<sup>16</sup> *Utopia*, ed. *cit.*, 190 ff; Adams, *ibid.*, 54-56.

<sup>17</sup> Cf. Adams, *op. cit.* (1945), 135 f.

namely the methodical use of reason to understand a universe of natural law through direct observations and experiments and to use the knowledge thus acquired to benefit human society.

As I understand the Utopian philosophy, living “according to nature” does not refer only to a natural *moral* law. To the rational Utopians all natural phenomena, rightly interpreted, indicated God’s or “nature’s” laws. Fields which are now regarded as separate (such as “natural” and “social” science), the Utopians held to be organically joined, since all drew their fundamental assumptions from the same core of religious thought. Whatever was, according to the Utopian standards, “according to nature” must of necessity be morally sound, since natural law was taken to represent God’s or “nature’s” will. Perhaps natural science as it appears in More’s *Utopia* should be termed “natural-social,” the better to suggest this organic relationship.

Generally speaking, what were the observations and “experiments” from which the Utopians formed their conceptions as to what was “according to nature?” To them the whole world of nature and of man appeared as similar to a universal laboratory, whose full-scale operations had been going forward throughout history. Hence written history, as well as contemporary practice, was considered as records and illustrations of the trials and errors through which man had discovered, in one way or another—sometimes through intelligent and self-controlled actions, sometimes through blind groping and blundering—what was in harmony with and what was in conflict with nature (or natural law). Pragmatic in their outlook, the Utopians considered that whatever social actions had produced healthful pleasure (or were not specifically known to be injurious to society) were presumably “according to nature.” On the other hand, pain and conflict (e.g. on a great scale, man-made catastrophe, such as war) was presumably the result of an attempt (necessarily doomed to failure) to go contrary to natural law.

Fortunately for those with wit enough to benefit from the rational study of past and contemporary history, the bulk of the full-scale “experiments” which it was requisite that man should know had already been carried out, if only by trial-and-error, during the earlier stages of life on earth and especially, for the Utopians, during the 1760 years which were said to have been required for the construction of the Utopian commonwealth. As More repre-



sented the Utopian philosophy, natural (or natural-social) science and rational critiques born of science provided the Utopians with an indispensable means for the discovery and correct interpretation of ways by which men might progressively achieve more completely harmonious adjustment to their social and natural environment. In short, through science the Utopians expected to discover and to justify God's or "nature's" ways to man.

As natural-social scientists, the Utopians set fairly clear bounds to their inquiries. In this, as in other fields of endeavour, their prime concern was to discover what was "necessary" for the advancement of the commonwealth. Hence the outstanding illustrations of applied natural science are found largely in what would now be termed the areas of "social" science. Nevertheless, the conclusion seems justified that in Utopia natural science was intended to represent one of the most powerful available instrumentalities by means of which purely rational men could achieve social progress. The contrast between life in Utopia and in the states (closely resembling Renaissance England and France) which were satirized in Book I of More's philosophic romance represented, therefore, the contrast between a commonwealth in which life was rationally ordered and progress achieved through the socially beneficent use of natural science and those states in which man-made catastrophe followed catastrophe as irrational and corrupt leaders struggled to carry out actions, great and small, contrary to nature.

It can be shown, I believe, that in the Utopian state many of the most distinctive social practices, including those which have caused More to appear prophetic of subsequent progress, represent the application of critiques derived from natural (or natural-social) science to the gradual improvement of the material bases of happiness in Utopian life. It is here only possible to suggest some of the outstanding examples (all of which are organic outgrowths of the unified philosophy which rules the development of this integrated state):

- (1) the planned balance between food needs of each major economic unit and the food-producing capacity of the economically accessible lands;<sup>18</sup>
- (2) the establishment of optimum sizes for all social units, from families to cities, at the level which has been demonstrated to be the most healthful;<sup>19</sup>

<sup>18</sup> *Utopia*, ed. cit., 119-125, 155-156, 169-171, 212.

<sup>19</sup> *Ibid.*, 119, 126, 153-156, 159-166.

(3) the organization of both production and distribution of all material necessities (such as food, clothing, and housing) to provide what is actually necessary to meet the calculated needs of the population and to provide a margin of safety;<sup>20</sup>

(4) the treatment of public health, including hospitalization, with special stress on reduction or elimination of known hazards or causes of disease (e.g. insanitary water supply and sewage disposal systems, insanitary food markets, use for food of spoiled material);<sup>21</sup>

(5) preparations for national defense, first by minimizing many causes of war, second by strategies designed to minimize loss of life;<sup>22</sup>

(6) above all, the methodical provisions undertaken to safeguard the moral as well as the physical health of individuals and society at large against the known causes of social corruption, (such as ideas and practices which undermine and destroy man's good nature, instances being the common European delight in bloodshed while hunting, in accumulating vast wealth, and in relishing the "glory" of offensive wars of aggrandizement).<sup>23</sup>

Nowhere in the picture of Utopia, however, do we find the powerful and characteristic Baconian lust to make all knowledge man's province and the restless Baconian desire for perpetual new inventions and material improvements which go beyond what the Utopians regard as naturally "necessary."

In two respects, certainly, life in Utopia contrasts strikingly with that represented in the *New Atlantis*. For one thing, there is the austere simplicity of the Utopians, the studied elimination of all unnecessary ornament and elaboration in costume, just as there is no parade of luxury or wealth in personal or public life. The highest Utopian officials wear garments of plain undyed homespun, and both manners and speech are of almost Quaker plainness.<sup>24</sup> Contrast all this with such a passage from the *New Atlantis* as that which pictures the color and pageantry of a scientist's public appearance—indeed a glittering spectacle:

He was a man of middle stature and age, comely of person, and had an aspect as if he pitied men. He was clothed in a robe of fine black cloth with wide sleeves and a cape. His under garment was of excellent white linen down to the foot, girt with a girdle of the same, and a . . . tippet of the

<sup>20</sup> *Ibid.*, 124, 140–152, 154–157, 161, 166, 169–171.

<sup>21</sup> *Ibid.*, 128, 157–160.

<sup>22</sup> *Ibid.*, 117–118, 172–173, 243–265 *passim*.

<sup>23</sup> *Ibid.*, 158, 169, 174–183, 195–202, 254–255, 270–274, 287–289, 299–307.

<sup>24</sup> *Ibid.*, 140, 150–151, 165–166, 195–196, 234 (of laws).

same about his neck. He had gloves that were curious and set with stone, and shoes of peach-coloured velvet. His neck was bare to the shoulders. His hat was like a helmet or Spanish Montera, and his locks curled below it decently. . . . He was carried in a rich chariot without wheels, litterwise, with two horses at either end, richly trapped in blue velvet embroidered, and two footmen on each side in the like attire. The chariot was all of cedar, gilt and adorned with crystal, save that the fore-end had pannels of sapphires set in borders of gold, and the hinder-end the like of emeralds of the Peru colour. There was also a sun of gold, radiant, upon the top, in the midst, and on the top before, a small cherub of gold, with wings displayed. The chariot was covered with cloth of gold tissued upon blue. He had before him fifty attendants, young men all, in white sattin loose coats . . . shoes . . . and hats of blue velvet, with fine plumes of divers colours. . . . Horsemen he had none neither before nor behind his chariot, as it seemeth, to avoid all tumult and trouble. . . . He held up his bare hand as he went, as blessing the people, but in silence.<sup>25</sup>

Such a spectacle would, to say the least, have provoked general ridicule among the Utopians, who dress plainly out of choice, not ignorance, and are greatly amused at the absurdities in dress which foreign ambassadors regard as refined splendors.<sup>26</sup> Why is homespun chosen by the Utopians when technologically they are capable of producing gold brocade? The answer comes from consideration of their philosophic and religious conception that the right use of reason leads the members of the commonwealth to "true" pleasure and consequently to physical and moral health when employed to produce what is naturally "necessary" for man. To be happy is to live according to nature, and as far as clothing is concerned this means to provide garments of the optimum amount and quality, both for work and for pleasure. The Utopians have found that homespun dress is generally more satisfactory than that made of scarlet silk, for instance, and is moreover less burdensome to produce, since it requires less labor—that is, less life.<sup>27</sup> Indeed, the whole Utopian economy seems designed to produce and to distribute equitably, at a shared minimum of labor, what all men need most,<sup>28</sup> including aesthetic necessities (such as comeliness in architecture of homes) or harmless if not strictly needful pleasures such

<sup>25</sup> *New Atlantis*, in *Essays, Advancement of Learning, New Atlantis . . .*, ed. Richard F. Jones (Garden City, N. Y., [1937]), 478–479.

<sup>26</sup> *Utopia*, ed. cit., 174–182.

<sup>27</sup> *Ibid.*, 150–152.

<sup>28</sup> *Ibid.*, 151.

as those derived from having music with one's dinner.<sup>29</sup> Not that a Utopian citizen would be forbidden to use his earned leisure to make gold brocade, as a sort of amusing toy for children.<sup>30</sup> If, however, he were to discard stout homespun for flimsy brocade and then were to believe and argue seriously that by virtue of his gorgeous raiment he was a better man than before, then by common consent he would have been judged to be irrational and insane.<sup>31</sup> Unless he thereafter tried with passion and violence to infect sane men with his folly, he would not be punished except by loss of the right of free discussion with the citizens; although of course this would be a considerable restriction of freedom, it would be justified in order to safeguard the commonwealth.<sup>32</sup>

In one other vital respect the use of science and technology in the Utopian state differs from that shown in the *New Atlantis*. It is made absolutely clear that in Utopia there is no separation of natural philosophy, or any other aspect of life, from basic ethics and religion.<sup>33</sup> Indeed, Utopian science in its more abstract forms is practically rational worship, as may be seen in the astronomers' delight in studying the ways of God as revealed in the orderly beauty of "the maruelous and gorgious frame of the worlde."<sup>34</sup>

In short, there is in the Utopian state no suggestion that desirable progress and general well-being would result from man's use of reason to conquer external nature in order to bring about endlessly increased luxury and power. Sane Utopians are represented rather as content with those things which reason and experience (i.e. history) have established as necessary for the welfare of the individual and the maintenance of a sound commonwealth. From the social experiments apparent in the history of nations which closely resemble the European, the Utopians have become keenly aware that human societies eventually sink into tyranny, disintegrate, or are torn apart by internal dissensions whenever material luxury has been pursued as an end in itself, and when rich men, as Raphael Hythlodaye says of those in Renaissance Europe, maintain, by hook or crook, "a certein conspiracy . . . , procuringe theire owne commodities vnder the name and title of the commen wealth."<sup>35</sup>

<sup>29</sup> *Ibid.*, 130, 166.

<sup>30</sup> *Ibid.*, 175–177.

<sup>31</sup> *Ibid.*, 195–199.

<sup>32</sup> *Ibid.*, 270–272, 275–276.

<sup>33</sup> *Ibid.*, 188 ff.

<sup>34</sup> *Ibid.*, 218.

<sup>35</sup> *Ibid.*, 303, but see the whole discussion, 299–307.

The Utopian citizens face a future of gradual progress, as they face death itself, with calm optimism.<sup>36</sup> By 1516 Sir Thomas More, however, had recognized the strong probability that Christian humanism would never receive from Henry VIII the assistance which that Christian prince had been joyfully expected to give after his coronation in 1509.<sup>37</sup> Speaking in his own person, More concluded *Utopia* on a note of tempered pessimism; for while in time to come, given the requisite initial leadership and vision, men had the power to build up a rational and just commonwealth, even a substantial beginning of this mighty, long-range work could no longer be looked for in his own lifetime. "So must I nedes confesse and graunt, that many thinges be in the vtopian weal publique, which in our cities I may rather wisse for then hoope after."<sup>38</sup>

#### IV

With all these Utopian ideas as to the relationship of science and social progress, let us now contrast the thought of Bacon as set out in the *New Atlantis* and related works which treat of his great plan for the perfection of science and the advancement of human welfare. In what follows I accept Spedding's conclusion that while the *New Atlantis* is incomplete, it seems intended for publication as it stands, that in it Bacon included "as if already known, the things he most wanted to know," and that most probably "the unfinished portions would have dealt with the method of scientific investigation rather than with the general problems of society."<sup>39</sup>

In the *New Atlantis* the "very eye of the kingdom" of Bensalem is Salomon's House, or the College of the Six Day's Works, an elaborately equipped institute for cooperative pure and applied scientific research, intended "for the finding out of the true nature of all things (whereby God might have the more glory in the workmanship of them, and men the more fruit in the use of them)."<sup>40</sup> Although this College is said to be "dedicated to the study of the

<sup>36</sup> *Ibid.*, 276-279.

<sup>37</sup> Chambers, *op. cit.*, 99-156; Adams, *op. cit.* (1945), 131-134.

<sup>38</sup> *Utopia*, *ed. cit.*, 309.

<sup>39</sup> Sir Francis Bacon, *Collected Works*, ed. J. Spedding, R. L. Ellis, and D. D. Heath, V (New York, 1859), 349-350. See also E. D. Blodgett, "Bacon's *New Atlantis* and Campanella's *Civitas Solis*," *PMLA*, XLVI (1931), 766; and A. B. Gough's criticism in his edition of *New Atlantis* (Oxford, 1915), xxviii-xxix.

<sup>40</sup> *New Atlantis*, *ed. Jones*, 459, 468.

Works and Creatures of God,"<sup>41</sup> the book contains no discussion of scientific and religious principles as being interfused. We may, however, observe the ideas suggested by the actions of the leading Atlantic characters. Typically a man of science, after a hard day's work in his laboratory, joined his fellows in "certain hymns and services . . . of laud and thanks to God for his marvellous works . . . imploring his aid and blessing for the illumination of our labours and the turning of them into good and holy works."<sup>42</sup> Here may be seen the kind of separation of science from religion that Bacon thought good. As Professor Willey said, while Bacon argued that science "leads us directly to God in the end," he desired to separate "religious truth and scientific truth . . . in the interests of science, not of religion. He wished to keep science pure from religion."<sup>43</sup>

The relationship of science to social progress is touched upon at many points in the *New Atlantis*. As we have seen, the invariable Utopian practice was to restrict production of material goods and services to what both natural philosophy and history had shown to be naturally "necessary" for personal health, pleasure, and sanity and, in the larger view, to what had been found essential to maintain the health and integrity of the commonwealth. The Utopian criteria were essentially pragmatic: no pleasure which was not definitely known to be socially baneful was prohibited, "For they be much enclyned to this opinion: to thinke no kynde of pleasure forbidden, wherof cummeth no harme."<sup>44</sup> In striking contrast, in the *New Atlantis* the boldest emphasis is laid on the idea that the main purpose of applied science is to bring forth endless, ever-increasing torrents of usable inventions and luxuries, or "fruits," for the delight of a supposedly insatiable public, perpetually in raptures over the latest, most novel productions of the laboratories and factories. For the improvement of foods and beverages, for instance, no limits are implied except perhaps those the natural flesh is heir to. Hence the plans (puzzling to some of Bacon's editors) for ceaseless scientific mul-

<sup>41</sup> *Ibid.*, 468.

<sup>42</sup> *Ibid.*, 490.

<sup>43</sup> Basil Willey, *op. cit.*, 29-30. The idea that science leads men to God is represented in the incident of the miraculous ark bearing the Christian scriptures, which none could approach save a pious scientist (*New Atlantis*, ed. Jones, 459-460). Cf. Douglas Bush, *English Literature in the Earlier Seventeenth Century 1600-1660* (Oxford, 1945), 261-268.

<sup>44</sup> *Utopia*, ed. *cit.*, 166.



tiplication of the varieties of pleasant drinks, of perfumes and precious stones, of delicious fruits and sweetmeats, of beasts and of birds.<sup>45</sup> In the *New Atlantis* we find therefore a notable early appearance of man considered, not (as with More and as with Hamlet before his disillusionment<sup>46</sup>) as most noble in reason and godlike apprehension, but as a "consumer"—as a sort of belly capable of almost infinite distention.

No doubt Macaulay's antithesis was over-simple; at any rate his praise of Bacon seems inexact. He asserted that "The aim of the Platonic philosophy was to raise us far above vulgar wants. The aim of the Baconian philosophy was to supply our vulgar wants."<sup>47</sup> Clearly in the Utopian state great care was taken to meet men's actual needs. Indeed, as a really thorough-going Elizabethan materialist put it, "If sack and sugar be a fault, God help the wicked!" Bacon elsewhere recognized claims of divine and moral philosophy, and perhaps it is true, as some have conjectured, that if the *New Atlantis* had been completed, its "tendency would . . . have appeared less materialistic."<sup>48</sup>

Nevertheless, one of Bacon's distinctive contributions to the idea of utopian progress, as foreshadowed in the *New Atlantis*, is the concept that science can be responsible for human happiness, not merely through providing the necessary things with which the Utopians, like Thoreau at Walden, sought to satisfy their vulgar wants and to gain leisure for peculiarly human joys such as those born of "the free liberty of the mind and garnishing of the same."<sup>49</sup> In the *New Atlantis* man's vulgar wants are becoming insatiable, and applied science therefore is turned to increasing without fixed limits the material goods and sensual luxuries available to the people. Yet human history, as the humanist Hythlodaye is aware,<sup>50</sup> and as portrayed in the Scriptures which

<sup>45</sup> Cf. *New Atlantis*, ed. Gough, xxxvi.

<sup>46</sup> Cf. *Utopia*, ed. cit., 152, on the pleasures which are highest and most distinctively human; cf. *Hamlet*, II, ii, 304-323; and E. M. W. Tillyard, *The Elizabethan World Picture* (London, 1943), [1]-2.

<sup>47</sup> "Francis Bacon," *Critical & Historical Essays*, [ed. A. Grieve] (London, [1910]), II, 273.

<sup>48</sup> *New Atlantis*, ed. Gough, xxxvii.

<sup>49</sup> *Utopia*, ed. cit., 152.

<sup>50</sup> *Ibid.*, 299-306, and Book I, *passim*; 105-114 and 43-58 for the analysis of the cause-and-effect relationship linking crime and poverty with the socially unrestricted, greedy pursuit of wealth without thought for the common welfare.

are known in Bacon's island of Bensalem, proves that such devotion to luxury has regularly tended to generate social corruption and disintegration.

We shall here only refer to those implications for the future development of the concept of utopian progress which relate to the pictures of both Utopia and Bensalem as not only geographic but also cultural, political, and technological islands of advanced civilization, having little interchange of ideas with the rest of the world, and enjoying a fortunate military position, since both islands are protected against invasion by formidable ocean barriers.<sup>51</sup> Only one point relating to scientific progress in warfare needs to be mentioned. The Utopians depend mainly on their strong natural defensive position, and are not said to be particularly superior to their neighbors in offensive weapons themselves. While they abhor war as most "beastly" (i.e. contrary to man's uncorrupted "nature"), they take such minimum measures as are deemed necessary for defence, but always they draw their decisive strength from trained men and minds joined by a bond of natural devotion to each other and to the commonwealth.<sup>52</sup> On the other hand, the scientists of Salomon's House, just as they labor incessantly to perfect all knowledge, so they strive to discover all possible poisons, new weapons, and improved techniques of warfare.<sup>53</sup> This

<sup>51</sup> Both More and Bacon—writing in an era of increasing nationalism—stressed severe limitations on travel and immigration, as well as on international interchange of ideas and social practices. Both represented it as possible for a national state, possessing ample human and natural resources, to achieve gradually a cultural condition superior to that of "backward" neighbor-states.

The Utopians claim no scientific secrets, however, and their control of traffic in ideas, like their rational practice of war when necessary, is strictly designed to safeguard public and private mental and moral health or sanity. See *Utopia*, ed. cit., 155, 243–265; and Adams, *op. cit.* (1945), 138–139, 144; and *ibid.* (1941), 60–65. Social progress in Utopia does not depend on a national hoard of scientific "secrets."

In the *New Atlantis* the picture is different. Scientific secrets are closely guarded as the most precious national possession and the one upon which progress depends. Scientific spies are sent abroad regularly to report details of foreign progress in technological fields. See *New Atlantis*, ed. Jones, 469.

Causes of war are dealt with rather extensively in both books of *Utopia*, and the main causes are identified as stemming from irrational actions by insane men who seek, contrary to "nature," various social goals. Nothing is said about the causes of war in the *New Atlantis*—a further reflection of Baconian optimism—and the people are represented as entirely peaceful.

<sup>52</sup> *Utopia*, ed. cit., 116–119, 243–265 *passim*.

<sup>53</sup> *New Atlantis*, ed. Jones, 483, 487.

implies no scientific or national ill-will toward states near to Bensalem, but represents simply another form of taking all knowledge for one's province—in short, another facet of the Baconian idea of progress.

## V

Both More and Bacon considered, it appears, that science can be made a major key to utopian social advancement through providing man with a way to acquire and use power over external nature. The principal question which remains is this: what safeguards (if any) did these thinkers judge were required to prevent scientifically-produced power from over-riding man's ability to control it? This question in turn involves at least two others: first, is man "by nature" rational and morally good so that he is incapable of anti-social use of power? and, second, is the power which science makes available to man in itself beneficent?

To discover the Utopian's probable answers to such questions we may analyze their ideas on human behavior, which appear as consistent expressions of their philosophy and religion of "nature." They reason that while the created natural universe (e.g. the stars in their courses) represents the purely rational, man is only born with the *capacity* for a life according to nature, or reason. The actual achievement and preservation of such a life depends on education, self-discipline, and a healthy environment. Throughout history, however, man's observed behavior has shown that human beings can become gradually corrupted and sunk into anti-social practices, and unnatural customs—in short, into insanities—whereupon men can become the most dangerous of creatures. When, for instance, children learn from an early age to admire and use anti-social behavior, as men they are likely to be almost beyond restoration to sanity. Like all those who refuse or are unable to live according to reason (as expressed in the *consensus gentium*, or common consent of all sane men), such people are never given citizen's privileges or powers in Utopia; and while as "bondmen" they may perhaps do some useful work, until their sanity has been re-established they must always be regarded as dangerous to the commonwealth.<sup>54</sup> To demonstrate the depths of cruelty and depravity to which men can descend willingly, the Utopians referred to the mercenary soldiers who in

<sup>54</sup> *Utopia*, ed. cit., 221 ff.

European-like civilization had come to take their greatest habitual pleasure in human butchery.<sup>55</sup> Most of Book I of *Utopia*, like much of Erasmus' *Praise of Folly*, satirizes various abuses of knowledge or power which had become time-honored even when the social results were plainly injurious to the commonwealth. Two of the most famous instances concern the irrationality of meting out brutal punishments to criminals but never eradicating the man-made social causes of crime,<sup>56</sup> and the insane readiness with which European princes often plunged their peoples into needless wars, largely for the sake of "honor" and "glory."<sup>57</sup> Indeed, throughout the social structure of Utopia great pains are taken to prevent anyone from acquiring unlimited power over his fellow-men. Such creations as fire or gold are regarded as in themselves ethically neutral; whether their effect on society is beneficent or destructive depends on how they are used by man.<sup>58</sup> Generally it is assumed that anyone who seeks to persuade others violently into agreement desires more power than is reasonable and necessary; so that his violence is to be taken as a symptom that he is losing his reason and is becoming socially dangerous,<sup>59</sup> like an unchecked fire or plague.

In the *New Atlantis*, in contrast, we find no such profound awareness of man's dual capacity for good or evil (i.e. anti-social) actions, but rather an expression of almost unbounded faith in human rationality, human goodness, and in the beneficence of scientific power over nature.

Salomon's House has for its ". . . End . . . the knowledge of causes and secret motions of things, and the enlarging of the bounds of Human Empire, to the effecting of all things possible."<sup>60</sup> Although the people of Bensalem accept divine miracles on faith, as beyond human understanding, I am unable to find any suggestion that in their dealings with other human beings they are considered capable of irrationality. The only hint of caution seems

<sup>55</sup> *Ibid.*, 252.

<sup>56</sup> *Ibid.*, 47-71.

<sup>57</sup> *Ibid.*, 80-99.

<sup>58</sup> *Ibid.*, 174 f., for instance; *ibid.*, 202; see Adams, *op. cit.* (1941), for the idea that while the "nature" of each thing is objectively fixed, corrupt (insane) men may be unable to grasp the truth and are thus accelerated on the road to social catastrophe.

<sup>59</sup> *Utopia*, *ed. cit.*, 270-272.

<sup>60</sup> *New Atlantis*, ed. Jones, 480.

implied in a chief scientist's statement that the public was not told all that was discovered but only what the College collectively thought wise: ". . . as it cometh to pass, we publish such new profitable inventions as we think good."<sup>61</sup> This restraint upon any possible abuse of power seems itself to depend upon the validity of several assumptions which now necessarily appear naive. Bacon's acceptance of these ideas helps to explain the unguarded optimism which irradiates the *New Atlantis*, however. The first is that the research College, the key to progress toward utopia, will constitute the highest power in the state and will be immune to coercion. The second is that the natural power embodied in the "new profitable inventions" which are made known will be in itself beneficent. In the third place, the men of science who form the College will be themselves virtually incapable of giving knowing permission for their discoveries to be turned to evil ends; or, if such abuses become imminent, the scientists will actually be able to arrest them.

For its value as corroboration of Bacon's belief in the over-all beneficence of scientifically-produced power, we may consider a passage in the *Novum Organum*. The context is an attempt to reassure any who felt uneasily that if Bacon's new proposals for the advancement of learning were to be realized, one crucial result would be to increase enormously man's capacity for evil, to which man's energies had so often been directed in history. To these objections Bacon replied:

Finally, if any object that Sciences and Arts are degraded to wickedness, luxury, and the like; let not this disturb any one. For this can be said of all earthly goods. . . . Only let man regain his right over Nature, which belongs to him by the gift of God; let there be given to him the power: right reason and sound religion will teach him how to apply it.<sup>62</sup>

"Such words fall on our ear as a piece of tragic irony," wrote Professor Douglas Bush, and he continued:

We may be unsympathetic because three centuries of progress have made it clear that the conquest of external nature is an inadequate goal, that, as Shelley said in one of his unBaconian moods, "Man, having enslaved the elements, remains himself a slave." Not that Bacon contemplated such an

<sup>61</sup> *Ibid.*, 490.

<sup>62</sup> *The Novum Organon* [sic], trans. G. W. Kitchin (Oxford, 1855), part III, par. 129, p. 111. On Bacon's optimism and its intensification in his disciples, see Bush, *op. cit.*, 268-274.



end. . . . But if scientific power was to override the assumed safeguards, Bacon himself cannot be cleared of all responsibility. His separation of the realms of knowledge and faith, and of external and internal morality, was all the more damaging for not being cynical. . . . But the whole drift of his scientific and ethical thought was towards empirical, irreligious naturalism. He wished, with a reverent knowledge of faith, to exclude theological and institutional idols from the temple of science, and in doing so he virtually denied the validity of a religious view of the world. . . . To machinery and material progress he sacrificed, in a large and noble way, to be sure, that scale of spiritual and ethical values which the best minds of antiquity, the Middle Ages, and the Renaissance had striven to make prevail.<sup>63</sup>

We see Bacon's tremendous optimism, expressed with an emotional force which no doubt "owed something . . . to his sense of man's actual misery as well as of his potential grandeur"<sup>64</sup> in the really marvellous declaration: "Only . . . let power (over nature) be given; the exercise thereof will be governed by sound reason and true religion." I take it that this Baconian statement implies the idea that material progress is somehow positively related to moral progress, that it may be generally assumed as true that man owns rationality and morality which are adequate for beneficent control of unlimited power over nature, and that in short the primary problem, if utopian progress is to be assured, is the acquisition of that power, which may be expected to follow from grand-scale application of the right methods of scientific investigation.<sup>65</sup>

At the outset, the complex of utopianism was defined and iden-

<sup>63</sup> *Ibid.*, 267-268.

<sup>64</sup> *Ibid.*, 274.

<sup>65</sup> Bacon's optimism is thrown into relief by contrast with doubts of others in or before his time, that science, especially as used in war, leads to social progress. Some, like Jean Bodin in the sixteenth century, thought that the mariner's compass, printing, and gunpowder might in time change the world, "as it were, into a single state." See J. B. Bury, *The Idea of Progress* [New York, 1932], 37-44. Louis Le Roy, commenting on the same three inventions, apropos the question of the superiority of the moderns over the ancients, thought that the first two clearly showed this superiority. He added, guardedly, "I would give the third place to gunnery but that it seems invented rather for the ruin than the utility of the human race" (*De la vicissitude ou variété des choses en l'univers*, 1577, 2nd. ed. 1584 cited by Bury, *op. cit.*, 44). When Bacon commented on the social progress which had resulted from the same three inventions, he characteristically was optimistic and little troubled about the potential ruin as well as benefit which applied science could produce in society. See *Novum Organon*, *ed. cit.*, 110-111.



tified as one of the dynamic ideas which have largely governed the social thinking of liberal, humanitarian groups in the west for the past two hundred years. Almost every essential element of this utopianism has been found to be represented in the *New Atlantis* and related works rather than in More's *Utopia*. Milton, like many others, misread the *Utopia*, lumped it with Bacon's work, and wrote in the *Areopagitica*:

To sequester out of the world into Atlantic and Utopian polities, which never can be drawn into use, will not mend our condition; but to ordain wisely as in this world of evil, in the midst whereof God hath placed us unavoidably.<sup>66</sup>

Actually, as R. W. Chambers said, "the remarkable thing about *Utopia* is the extent to which it adumbrates social and political reforms which have either been carried out into practice, or which have come to be regarded as very practical politics."<sup>67</sup> It should be stated once and for all that in the Utopian state More did not represent a fantastically "ideal commonwealth,"<sup>68</sup> but was fundamentally concerned with ordaining wisely as to the prospects for the advancement of human welfare as in this world of evil.

Nowadays the word "utopian" is generally used by those who wish to signify something "visionary and impractical, . . . a fancy of what this world might be like if the dreamer could shatter it to bits and then remould it nearer to his heart's desire." When we consider the significance of Bacon's failure in the *New Atlantis* to consider adequately the problem of safeguarding society against the formidable potential of evil men for anti-social use of power, it appears that not "utopian" but "Atlantic" should be used to suggest the truly visionary and impractical. In the twentieth century, as the climax to some three hundred years of progress, man has certainly discovered power over nature which exceeds Bacon's wildest dreams. Everywhere, at the same time, there is tragic uncertainty whether or not this fateful power, of which one form only is the atomic bomb whose invention has changed war

<sup>66</sup> *The Student's Milton*, ed. F. A. Patterson (New York, 1934), 740-741.

<sup>67</sup> *Thomas More*, 125.

<sup>68</sup> The original title page read in part, *De optimo reip. statv . . .*, which Robinson translated as "the best part of a public weal." In the light of the whole Utopian philosophy even this title-page shows that "best" means "the best possible" (the optimum). See *Utopia*, ed. cit., plates opposite lxxvi and 12.

into “an instrument of universal destruction,”<sup>69</sup> will be used beneficently under the government (as Bacon was confident) of “sound reason and true religion.” When we compare the ideas of More and Bacon upon the social responsibilities of science for utopian progress, it appears that in the most crucial respects not More but rather Bacon was the dreamer. Critical study makes it clear that *Utopia* embodies contributions of great positive value for the healthy growth of western civilization.

## VI

In conclusion, what are the outstanding contemporary estimates as to the future of utopian progress through science, especially as these prospects are viewed by leading scientists and their critics? It has been suggested that there is a parallel between the crisis in twentieth-century civilization and the dynamic ideas which have tended to inspire the direction of cultural growth since the Renaissance.

Broadly speaking, the widespread western belief in the validity of the idea—indeed, of the law—of progress reached its zenith just before World War I. “Within the last forty years (i.e. 1880–1920),” wrote J. B. Bury in 1920, “nearly every civilized country has produced a large literature on social science, in which indefinite Progress is generally assumed as an axiom.”<sup>70</sup> Since 1914, however, the use of applied science expressed in mass destruction, together with the rise of totalitarianisms in which barbarism has been found to be married to extremely well-developed natural science, has profoundly shaken, where it has not shattered, belief in the inevitability of utopian progress through science, even before the invention of the atomic bomb in 1945.<sup>71</sup> I

<sup>69</sup> James T. Shotwell, “The Control of Atomic Energy Under the UNO Charter,” *Symposium on Atomic Energy and its Implications, PROCEEDINGS OF THE AMERICAN PHILOSOPHICAL SOCIETY*, 90 (Jan., 1946), 64. Hereafter this work will be referred to as *Symposium (1946)*.

<sup>70</sup> *The Idea of Progress* (London, 1920), 348. In the 1932 (2nd) edition of this work Charles A. Beard wrote (p. xxix) that “The survival value of the idea of progress as a way of thinking seems established beyond question, unless . . . the historical chain of the ages should be suddenly broken by strange interpositions utterly beyond all previous human experience.”

<sup>71</sup> See, e.g., George Sarton’s foreword in Bernard Jaffe, *Men of Science in America* (New York, 1944), xvii; Lewis Mumford, *The Condition of Man* (New York, 1944), *passim*; and especially *Symposium 1946, passim*. Such citations could easily be multiplied almost indefinitely.

suggest that a considerable part of the mounting pessimism which has appeared in post World War I literature in England, America, and on the continent is related to an increasing social awareness that modern scientific power appears to have outrun available human controls and has been turned against mankind, by providing perfected instruments for mechanized tyranny and mass destruction. One striking result of such use of applied science, climaxed by application of nuclear fission (undoubtedly an epochal thing) first of all to military purposes, is granted by scientists themselves to be a revival of the feeling toward science found long ago in Marlowe's *Faustus*.<sup>72</sup> At the same time there has been an unprecedented increase of awareness on the part of many scientists that the separation of science from ethics—or from social science—is today accelerating progress toward international catastrophe.<sup>73</sup>

Such sentiments on the part of a large number of leading scientists have emerged but very recently, and they are illuminated and in part no doubt caused by what Dr. Vannevar Bush, President of the Carnegie Institution of Washington, has termed “The fierce present light thrown by extraordinary (military) applications of science.”<sup>74</sup> According to the best recent study of the social relations of science, “The beneficence of science has not been seriously doubted during the last three centuries [i.e. since Bacon's time], and the majority of scientists have plodded happily along . . . taking the justification of their work for granted.”<sup>75</sup> That justification has come from what may be called Bacon's scientific faith: namely, that knowledge is power and good in itself, that science is socially justified by its practical beneficence for mankind at large, and that the cultural good resulting from material progress is virtually certain to outweigh decisively any evils which may appear in the train of man's forward march toward utopia.

<sup>72</sup> J. R. Oppenheimer, “Atomic Weapons,” *Symposium 1946*, 7–9.

<sup>73</sup> See J. G. Crowther, *The Social Relations of Science* (London, 1941), vii–viii, 576–652 *passim*; Stanley Casson, *Progress and Catastrophe* (New York, 1937), esp. Chapt. 17; and *Symposium 1946*, *passim*. A great share of this awareness has developed since as late as 1932, when C. A. Beard wrote of contemporary scientists and technologists in general: “Seldom do they touch on the effects of their labors upon mankind, the social adjustments made necessary by their operations, and the potentialities ahead” (Bury, *op. cit.*, 1932 ed., xxi).

<sup>74</sup> Report to the trustees of the Carnegie Institution of Washington, as given in the *New York Times*, 14 December 1946, p. 9.

<sup>75</sup> Crowther, *op. cit.*, vii.

The fairly rapid expansion of popular belief in the idea of progress in the late eighteenth and nineteenth centuries was, moreover, linked closely with the view that the slow increase of man's earthly happiness would continue inevitably and indefinitely in *time*. Furthermore, it was widely assumed that the cure for such evils as appeared at times to accompany the advance of science and machinery lay in ever more such progress, which was confidently expected to come about in due *time*. Indeed, one of the forces in modern culture which has been stressed by historians has been that represented by the geographical frontiers of the world.<sup>76</sup> While their disappearance in the late nineteenth century produced continuing repercussions throughout our society,<sup>77</sup> it has been widely assumed as part of the idea of utopian progress that at least one frontier could never disappear—the supposedly endless one created by beneficent science working through all time to explore the inexhaustible mysteries of the universe, in order to enhance the welfare of mankind.

The practical effect of recent known, as well as unannounced, scientific inventions has been, however, to close or block—perhaps temporarily—this *frontier in time* which only a few years ago was widely believed to be limitless. Thus one of the most distinguished American scientists wrote late in 1946:

. . . The principal question is whether there is time enough; whether, in short, there must be another demonstration of the power of applied science to destroy before mankind as a whole recognizes that a new approach toward international functioning is demanded.<sup>78</sup>

The problems surrounding continued progress, conceived as related to the social applications of scientific discoveries and inventions, were dealt with briefly but decisively in an unprecedented symposium on atomic energy and its implications, held at Philadelphia in November, 1945. All the participants were men of the highest distinction in American physical and social science, and several aided critically in the production of the first atomic bombs. These points are emphasized in order to make it clear that this symposium represents, not any "idle threat nor the . . . panicky

<sup>76</sup> See, e.g., Harry Faulkner, *American Political and Social History* (New York, 1937), Chap. XXV.

<sup>77</sup> See, e.g., *American Issues*, I, *The Social Record*, ed. W. Thorp, M. Curti, and C. Baker (Chicago, [1944]), 638–660.

<sup>78</sup> Dr. Vannevar Bush, as quoted in the *New York Times*, 14 Dec. 1946, p. 9.

reaction of mere laymen," but statements which "... come first from those whose theoretic and practical knowledge of atomic energy gives them the fullest authority to predict the consequences of its misuse."<sup>79</sup>

The consensus of this symposium was expressed by Dr. J. R. Oppenheimer, who said: "... we have made a thing, a most terrible weapon, that has altered abruptly and profoundly the nature of the world. . . ."<sup>80</sup> The progress in perfection of scientific weapons has now confronted the peoples and the great nations of the world with two alternatives. The first is to follow the cultural pattern which has become usual since the Renaissance: according to this, the nations will either engage in or continue the existing [early 1947] race in atomic armaments, whose large-scale use in any future world war would become inevitable and should be expected to destroy the greater part of the western civilization which has survived World War II. The other alternative is for the great nations to accomplish within a relatively few years the cultural changes which will make total war impossible. For only by making total war impossible can there be lifted from mankind this latest fruit of progress which, the atomic scientists agree, is "... a vast threat" and "terror to all the peoples of the earth," contained in "the completely common peril that atomic weapons constitute for the whole world."<sup>81</sup> To sane men it is now clear that what Dr. Reinhold Niebuhr has called "the ultimate task of the human community"<sup>82</sup>—the construction of a world order at least sufficient to prevent war, can no longer be postponed. Unfortunately, not only does the requisite basis for such a world community not now exist,<sup>83</sup> but there is no comfortable certainty that this basis can be created within the time available (i.e. before all great nations may be expected to be equipped to wage atomic war).<sup>84</sup>

<sup>79</sup> Lewis Mumford, *Values . . .* (1946), 82.

<sup>80</sup> "Atomic Weapons," *Symposium 1946*, 7.

<sup>81</sup> *Ibid.*

<sup>82</sup> *Discerning the Signs of the Times* (New York, 1946), 83.

<sup>83</sup> See Jacob Viner, "The Implications of the Atomic Bomb for International Relations," *Symposium 1946*, 53-58; Joseph H. Willits, "Social Adjustments to Atomic Energy," *Ibid.*, 48-52.

<sup>84</sup> See Dr. Irving Langmuir, a Nobel Prize winner, "World Control of Atomic Energy," *Symposium 1946*, 65-69 and his statement in *New York Times*, 17 November 1945; the statement by the "Emergency Committee of Atomic Scientists" of

There is, moreover, general agreement among both physical and social scientists that the scientific problems which were overcome when the first atomic bombs were made (not to speak of other scientific means for mass-destruction, such as bacteriological warfare, which are known to have been developed but not used) were, if anything, less difficult than the social and political problems involved in preventing war.<sup>85</sup> Dr. Robert M. Hutchins, Chancellor of the University of Chicago, was therefore not guilty of exaggeration when he wrote that "The task is overwhelming, and the chance of success is slight. We must take the chance or die."<sup>86</sup> Many leading scientists, at least—if not masses of the world's peoples—have at last awakened from the long dream of Baconian progress, have awakened and are beckoning men to help safeguard their slowly built-up civilization and its treasures, while there is time. All this has been said best by the man who held leadership in the first production of successful atomic weapons, Dr. J. Robert Oppenheimer of the University of California, one of the world's most brilliant physicists:

(It may seem visionary to believe that) it is a practical thing to avert an atomic war. . . . If it is recognized, as it should be recognized, that this, for us, in our own time, is the fundamental problem of human society, that it is a precondition not only for civilized life, or for freedom, but for the attainment of any living human aspiration, then it will not be impossible.<sup>87</sup>

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Princeton, N. J., in *Newsweek*, 2 December 1946, p. 66; and the monthly *Bulletin of the Atomic Scientists*, published since late 1946 by scientists at the University of Chicago and elsewhere.

<sup>85</sup> See *Symposium on Atomic Energy . . . 1946*, *passim*; Quincy Wright, *A Study of War* (Chicago, [1942]), 1310–1352.

<sup>86</sup> *The Atomic Bomb Versus Civilization* (Chicago: Human Events, Inc., [1945]), 13.

<sup>87</sup> *Symposium 1946*, 9.