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Presidential Address

A laboratory for progress

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I have a sense of happiness today, and I wish to share this experience with you.

My happiness results not only from the high honor you have shown me by entrusting this office to me and from the blessings that have been granted me in my personal and professional activities.

My happiness prevails primarily because I perceive a pattern developing. As I look about, I find countless evidences that the milieu in which we exist is moving inexorably toward some kind of objective, like a vast laboratory proceeding in stepwise manner according to a relentless protocol. I see that we exist in a laboratory for progress. Over and above all the injustice and chaos, our world functions according to a grand design, and its product is progress!

The evidence for this proposition is ubiquitous, but I will be able to present just a few examples of how I perceive that this laboratory operates. I will do this first by looking at some events that are closest to our unique experience as thoracic surgeons—specifically, by reviewing early interesting developments within the history of our specialty, both general thoracic and cardiovascular surgery. Next, I will find examples of the laboratory in operation by reviewing the birth of The American Association of Thoracic Surgery and by analyzing the origins and contents of our JOURNAL. But then, I will escape the restricted perspective of medical science and seek evidence of this design for progress by looking at our world from the broadest possible perspective. Next, it will be well to acknowledge some of the impediments to progress that seem to confront us and confound the functioning of this laboratory at this time. Finally, I will attempt to prophesy how these impediments and obstacles will be overcome. This is an immensely ambitious subject for a single essay, but I can at least try.

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Progress in our specialty

General thoracic surgery. Our specialty of thoracic surgery was the last of all the family of major surgical subspecialties to advance to widespread clinical utility. Why was it so delayed? An answer appears in the first presidential address given before this Association at the time of our first scientific meeting, held in Chicago on June 19, 1918.[1] That address was entitled simply "Thoracic Surgery" and was delivered by Dr. Samuel J. Meltzer of New York City, our first president. He extensively expanded on his concern that thoracic surgery received inadequate attention and support compared with abdominal surgery. By the way, the first

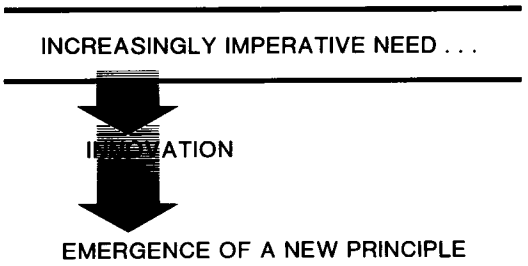

Fig. 1. The fundamental modus operandi of the laboratory for progress.

president, Dr. Meltzer, was not even a surgeon but was an internist, a medical chest specialist who pioneered the technique of intratracheal insufflation, or what has since come to be known as endotracheal ventilation. He said that surgeons, "great and medium size" (some sarcasm there, I perceive), did not hesitate at all at opening the abdomen and manipulating the abdominal organs. He accused otherwise bold and well-trained surgeons of suddenly becoming excessively conservative when confronted by thoracic diseases, simply because they did not understand the physiology of ventilation in the open chest.

The next address of that first program was by the founding force of our Association, Dr. Willy Meyer, who gave a speech that must have lasted a full hour and that he claimed was extemporaneous. The title was "A Review of the Evolution of Thoracic Surgery Within the Past Fourteen Years." I wondered why it was 14 years and not 10 or 12 or 20. Meyer reiterated Meltzer's argument. He admitted that surgeons everywhere had attempted innovative intrathoracic operations, even most of the procedures we use today, but implied an extremely high risk because of the danger of an acute pneumothorax. Dr. Meyer then made it clear why he dated the onset of his review, and by inference the true onset of modern thoracic surgery, to 14 years earlier, or 1904. That was the year that Sauerbruch, in Germany, briefly published the principle of "operating under differential pressure."[2] It was this breakthrough that ultimately led to the method of tracheal intubation and positive-pressure ventilation and thus opened the door to safe thoracic operations.

In summary, thoracic surgery experienced an increasingly imperative need to overcome the problems of pulmonary ventilation while the chest was open, a need for some sort of new approach. As a direct consequence of a novel insight into the problem, a new principle emerged—positive-pressure endotracheal ventilation. This, then, is our first glimpse of the pattern that is repeatedly observable in all branches of medicine and science and indeed in all human affairs (Fig. 1). Increasingly imperative need causes a novel theory to emerge in an effort to fill this need, a scientific revolution is born, and a new principle of understanding or a new technology is established. This mechanism seems to be the fundamental modus operandi of this laboratory for progress in which we live.

Cardiovascular surgery. Cardiac surgery lagged even farther behind general thoracic surgery, and for understandable reasons. But again, the pattern was that of a gradually increasing need for scientific breakthrough. Cardiac surgery may be said to have been born almost 90 years ago, when Ludwig Rehn[3] of Frankfurt successfully repaired a stab wound of the heart. Then, at the turn of the century, Alexis Carrel,[4] a founding member of our Association, performed startling procedures on the cardiovascular system of animals. Subsequently, many clinical surgeons ablated parts of the autonomic nervous system to relieve angina, and imaginative efforts to bring blood to the heart through collaterals followed years later. Precocious approaches to valvular heart disease were tried in about 1925,[5,6] but they remained dormant for another 23 years. Successful closure of a patent ductus arteriosus,[7] really a vascular anomaly, was forerunner by a few years to the first surgical procedure for congenital cardiac disease, the palliative Blalock-Taussig shunt, which was introduced just 40 years ago.[8]

Again, an increasingly imperative need was building up—a need to be able to work within the open heart. Progress awaited a breakthrough to occur in response to that increasingly imperative need. In this instance, the breakthrough was the successful application of cardiopulmonary bypass, in 1953, through the work of John Gibbon, Jr.,[9] and others. Only then could all the marvelous plumbing techniques of modern cardiac surgery begin to unfold in natural sequence.

Time does not permit me to review all the modern marvels of surgical progress that have become commonplace in our thinking and in our practice. In a sense, every paper on the program of this year's annual meeting exemplifies an attempted answer to a need for new information, or a new concept, or a new technique. That is the chief criterion by which program committees or editorial boards select reports for presentation and publication. Clearly, we can affirm that the arena of thoracic and cardiovascular surgery offers strong supportive evidence that our world represents a laboratory for progress that functions on the principle that breakthrough occurs in response to increasingly imperative need.

This, then, appears to be the protocol whereby

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humanity repeatedly moves upward step by step on the ladder of progress. Thomas S. Kuhn, a historian of science, noted that "the novel theory seems a direct response to crisis." He also observed that "the new paradigm emerges all at once, sometimes in the middle of the night, in the mind of a man deeply immersed in crisis." The word "paradigm" is a special word used to denote a universal model, example, or tradition. This pattern for progress has been consistently observed by Kuhn,[10] as demonstrated in his book *The Structure of Scientific Revolutions.* Kuhn identifies time after time an emerging critical need that leads to some totally new theory, observation, or technique—a scientific revolution, he calls it—and ultimately to the emergence of a radically new principle.

The American Association for Thoracic Surgery. Next, let us look at this organization itself. Although I have already quoted from addresses given in 1918 at the first scientific meeting of our Association, it was really in the previous year, 1917, in this very city, that the Association was founded. This national organization was the first in the world devoted to the specialty of thoracic surgery. It was principally fathered by Dr. Willy Meyer. The official listing of charter members of the Association identifies only Dr. Willy Meyer as "founder." Four years earlier, in 1913, Dr. Meyer had delivered a brilliant paper at the meeting of the American Medical Association in Minneapolis. The title was "Extrathoracic and Intrathoracic Esophagoplasty in Connection with Resection of the Thoracic Portion of the Esophagus for Carcinoma." Remarkably, that paper discussed all the current methods, including replacement by stomach, large or small intestine, skin tubes, and even prostheses. But there was not so much as a single discussion of that paper, and *The Journal of the American Medical Association* found only enough space for publication of a brief abstract of his manuscript. Such was the lack of interest in thoracic surgery then; and such was probably the genesis of Dr. Meyer's realization of the need for an organization *for* thoracic surgery. It was a dream that would not be turned aside even by the great tragic war of totality that engulfed the world in the same year as the founding of this Association, namely, 1917. In fact, several of the founding members were excused from its early meetings because they were at war. It was a difficult beginning, and we are told that after only 7 years, fewer than half the charter members still belonged to the Association. Yet, despite all these obstacles, an increasingly imperative need for such an organization was recognized, and the fledgling Association was born and survived as a response to that need.

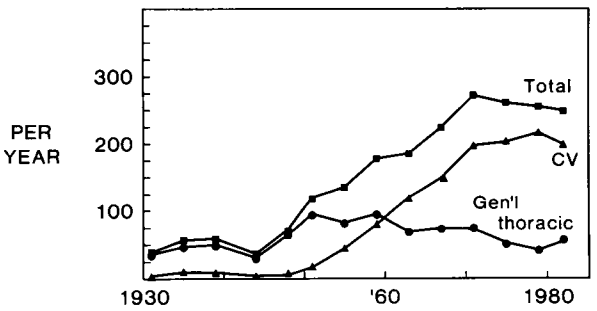

Fig. 2. Total papers published annually in THE JOURNAL OF THORACIC AND CARDIOVASCULAR SURGERY since its inception. *CV,* Cardiovascular. (Modified from McGoon DC: Half a century of Journal publication, THE JOURNAL OF THORACIC AND CARDIOVASCULAR SURGERY. Cumulative Index, volumes 1-84, 1931-1982, St. Louis, 1983, published by The C. V. Mosby Company.)

Dr. Meyer nominated the first executive committee of the Association, humbly placing himself as vice-president, Dr. Samuel Meltzer, the internist, as first president, and Dr. Nathan Green as treasurer. It seems fitting that Meltzer was born in Russia, Meyer in Germany, and Green in Ceylon. Our Association has continued in an international role, as evidenced by its membership and by those distinguished surgeons from around the world who appear on its programs and attend its annual meetings. We are proud of this international role and grateful for the many distinguished colleagues from abroad who attend and participate in our annual meetings.

The JOURNAL. Now let us look at the JOURNAL of this Association. The record dealing with the publication of our scientific papers seems to me to be particularly interesting. In 1981, the first half century of publication of the JOURNAL was celebrated,[11] the longest period of publication for any journal of this specialty. In the earlier years, that is, before 1931, the publication of papers delivered at Association meetings was quite disorganized. Each author was at liberty to publish his remarks in a journal of his choosing. Many papers never appeared in print. Furthermore, this arrangement proved wasteful for the Association, until it finally became necessary to borrow from individual members the money required to tide over the Association until an independent journal could be established. An increasingly pressing need became evident for a journal dedicated to the interests of thoracic surgeons. A response to that need came in 1931 in the form of the new and pioneering periodical, THE JOURNAL OF THORACIC SURGERY. The name was later changed to THE JOURNAL OF THORACIC AND CARDIOVASCULAR SURGERY. Dr. Evarts

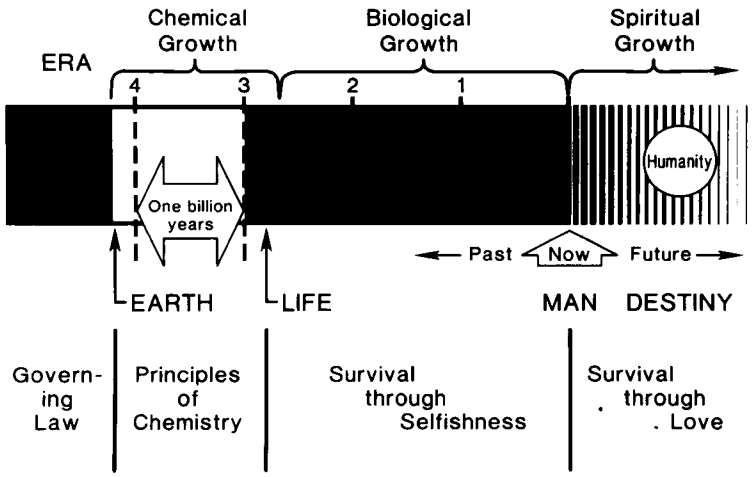

Fig. 3. The four great events of our world, from birth of Earth to the future appearance of fully realized humanity. Also shown are the prevailing laws for the three intervening eras.

Graham of St. Louis became the first Editor. The publisher has always been The C. V. Mosby Company.

Recently, through the typical cooperation of our publisher, The C. V. Mosby Company, an invaluable index of the entire first 84 volumes of the JOURNAL was compiled and published.[12] Furthermore, this event provided the stimulus to look analytically to the record of progress these volumes contain.

The number of papers published during each of the more than 50 years ranged from 35 to 276, and the total for the entire half century was approximately 8,000 reports (Fig. 2). The steep increment in reports published in the JOURNAL during its expansive middle 3 decades is entirely attributable to the growing importance of cardiovascular surgery. The near monopoly of interest (80% to 90% of all papers) held by general thoracic topics during the first 1½ decades was steadily reversed during the next 2 decades to culminate in the recent decade in almost as overwhelming a preponderance of cardiovascular reports. The crossover, when the number of reports dealing with each of these two primary interests became equal, took place about 1960.

Some interesting transitions took place. For example, conditions reported in the general thoracic category were predominantly and about equally either infections or neoplasias, with the other four groupings clustered at lesser frequencies. Infection, the disease under consideration in about half of all general thoracic papers during about the first 1½ decades of the JOURNAL's history, became precipitously less frequently encountered through the next 2 decades, to reach a nadir of just 2% of all general thoracic papers in 1975. Contrariwise, neoplasia accounted for only 3% of general thoracic papers the first year of publication (1931) but gradually and progressively increased, until in 1982 it accounted for exactly 50% of them. This transition is especially emphasized in papers relating specifically to the lungs and pleura.

The complete report of this analysis of the papers published in the JOURNAL appears as the introduction to the 50-year index.[13] Suffice it to say here that the chief movement of all this recorded experience and investigation is from ignorance toward knowledge, from ineffective treatments to more effective ones, and from helplessness to capability. In short, the JOURNAL came into existence to fill an increasingly imperative need, and it provides further documentation of the concept that we find ourselves living in a great laboratory for progress.

Progress in the world

So now, having thus far surveyed only events close to our specific interests, let us recklessly throw back all barriers of time and space and all limits to our perception and see what we can find out about progress in the vast and marvelous world in which we live. Some of you may recognize that this is a summary of similar comments I[14] made previously, but I hope you won't resent their restatement here. I simply cannot exclude my deepest beliefs from my remarks at this momentous occasion in my life.

We understand that the beginning of our universe occurred about 18 billion years ago, but *our* solar system, including its planet Earth, began some 4½ billion years ago. A time line of the record of Earth's

great historic events shows that after desolate geologic ages, Earth's atmosphere changed, and ultimately life appeared in very basic forms, some 2½ to 3 billion years ago (Fig. 3). Then, in ever more rapid crescendo, especially in the most recent ½ billion years, the tree of life expanded and life forms of ever-increasing complexity appeared. Then, just 1 million or so years ago, and thus squeezed up against the time line representing now, the human brain came into existence. Although the key to this expansion of the tree of life is, of course, the survival of the fittest, the quality known as intelligence has proved to be the most predictive of the capacity to survive.[15] As one ascends the tree of life, one climbs higher and higher on the ladder of intellectual capacity.

I predict that in the coming decade, a growing sense of respect and reverence for this native human intelligence will appear. We will increasingly realize that the obfuscation and deregulation of our cerebral function that result from the use of drugs and alcohol are highly counterproductive and destructive of happiness. This realization will lead to a progressive revulsion against the current massive intake of such agents. This revulsion will be similar to that which appeared during the last decade to the use of tobacco. Our profession, prominent in the antismoking movement, should now become at least as active in spearheading a new campaign in the name of moderation or abstinence.

It is our intelligence that prompts us to sense beauty, to reach upward, to learn, and to crave progress toward the better life. Progress is our one greatest overbearing yearning, perhaps a genetically driven impulse. Progress increasingly obsesses mankind and surely has become the central motivation for the activities of physicians and surgeons.

Thus, there appear to be three historic events in our world and one event yet to come. The births of Earth, life, and man have taken place. Finally, at some distant time in the future, the ultimate fruition and fulfillment of mankind will be reached—the birth of fully realized humanity. This future nebulous goal must represent the great millennial event toward which all of our struggles for progress are directed. Kuhn, the science historian, has referred to this as a time of the full, objective, true account of nature. He[10] noted, furthermore, that some scientists would consider that the proper measure of our scientific achievement is the extent to which science has brought us closer to that ultimate goal. At the opposite, more theological viewpoint, a person such as Teilhard de Chardin[15] would refer to this ultimate fulfillment (his "omega point") as a time of "oneness with God." But I think they are both saying the same thing.

These historical intervals can be conveniently divided into three chief ages or eras. The ancient era of chemical growth was followed by the appearance of life and the long era of biological growth. Now, just begun, is the era of intellectual and emotional growth for humanity, which we might call the era of spiritual growth.

Progress has occurred during each of these eras, apparently by virtue of certain laws or regulations prevailing then. Initially, the ruling law was determined by the principles of chemistry. Next came survival of the fittest, with cunning or intelligence as the primary determinant of fitness. Self-centeredness was the prerequisite for biological advancement. Thus, the law governing this period was survival through selfishness.

A new law must prevail during the era of spiritual growth. If man cannot shake loose from selfishness, it seems he will inevitably destroy himself. Rather, the fittest in this era must surely obey the law of being one's brother's keeper. I might even risk for the moment the accusation of sentimentality by labeling the law for the era of spiritual growth as the law of love. This undoubtedly is the means for our salvation—the necessary response to the massively growing need for a new principle for human behavior. To attain such an elevated state is surely a desperately difficult struggle! Yet, viewed from the deep perspective of time, the inevitable thrust of history points toward ultimate victory.

Impediments to progress

The starry-eyed philosophy I am here espousing is not meant to imply that nothing could go wrong. Potential impediments to progress can be seen in almost every sphere of human involvement. Inevitably, every forward step of progress begets new sets of problems that require attention. Furthermore, a momentary slipup or irrational act could hurtle the whole phenomenon into disaster. Time does not allow us to explore these potential impediments in detail but allows us only to glimpse briefly a few important ones dealing with medicine, with war, and with politics.

In medicine. In the medical arena, one major impediment to progress that has come upon us with alarming abruptness is the realization that our knowledge, skill, and technology have not only allowed us to prolong life but also increasingly forced us to prolong the misery that sometimes can be associated with dying. Furthermore, the great expense of administering these medical advances requires serious cost-benefit considerations. Suddenly, we may be forced to learn not so much how to apply this or that new miracle of medical therapy but *when to withhold* it. This is especially true for the very organs and diseases with which *we* deal every day. Our

subspecialty is caught up more than others with this problem of when to call in the reserves of our immense surgical armamentarium or, especially among the aged, when to let life's struggle come to its appropriate and inevitable conclusion as quietly and peaceably as possible.

In war. Especially in our age, the greatest moral and physical calamity imaginable is war. War is a legitimate concern of thoracic surgeons. Witness the striking number of reports dealing with chest trauma published in our JOURNAL at the end of World War II.[13] The horrible reality of our day is that any future world war would be followed by no such reports—no reports at all—nothing at all—nothingness. But even regarding this issue of war, wherein lies our greatest concern, the germinating seeds of progress are nevertheless evident. Military technology has become perfected to the ridiculous extreme that any future world war could have no winner and no outcome save total desolation. But by proceeding to such limitless capacity, war itself becomes completely impractical. The perfection of war destroys war. An example of evil being destroyed by itself! Indeed, the certainty of the destruction of something by its own perfection becomes an excellent measure of that which is evil. Thus, through this threat of ultimate horror, we have again witnessed the effect of the laws of this laboratory we live in, which are so regulated that the overwhelmingly probable outcome is progress.

In politics. What about the remote possibility that these laws could be unforgivably broken through collapse of political process? The world is caught up in an ideologically oriented political struggle, with totalitarianism at one pole and freedom and individualism at the other. Neither communism nor capitalism will be victorious in this struggle. The ultimate victor will be not a particular economic system or a detail of governmental structure but a new attitude for mankind. It seems clear that supremacy will come to the social alliance that assures the growth and maturation of the individual human being. Such an alliance will successfully grope its way into the future with just the right degree of force to protect itself from destruction or subversion but with the ever-growing ability and wisdom to practice peaceful, truthful, merciful, compassionate existence, not only for its own but also for all peoples.

Thus, a massive need is developing on this planet, not primarily for some new scientific knowledge or some new technology, but for an attitudinal change in mankind—a change from greed to mutual concern, from mistrust to a firm faith in one another. If we truly do live in a laboratory for progress of the type I have been discussing, this immense developing need for an attitudinal change in mankind should someday lead to a response to that need, to an epochal breakthrough and the dawning of a powerful pattern of human fulfillment and happiness.

What is needed is time: time for the human spirit to mature, time for continued movement away from the biological phase of progress and its necessity for selfishness, time for the accumulation of spiritual strength in individual persons, time for the permeation of respect and caring into all avenues of human discourse, time for the protocol for this laboratory for progress to work its way through to completion.

If we only could collectively visualize and thus seek such a goal, all our ideologies and religious concepts and all our energies and strivings could proceed along ever-converging lines toward that common goal. Until then, alas, we must struggle with immense armaments, and we must walk a tightrope in the desperate hope that counterposed powers of destruction can remain balanced and neutralized just long enough.

The thoracic surgeon's role

What has all this to do with us as thoracic surgeons? This perception of the world should strengthen us both in our science and in our humanism to be pathfinders to a new attitudinal orientation for humanity. There is no more likely a segment of society to lead the way than the medical profession. We can rededicate ourselves to the service of humanity. As we move into a new era of medicine, we must reexamine what is the true and ultimate value of our professional activities. I would like to reiterate that all our efforts in research, education, administration, writing, and editing and our long hours of intensive labor at the operating table have *inherent* and transcendent value only in one respect—as an unselfish expression by skilled and dedicated surgeons of a concern for the welfare of needful human beings. It is an awareness of this single simple mission that we of the profession need to be clear about today. It is through such an example as this, provided by our enlightened profession, that humanity might best be led forward from the depths of its danger today on that long road toward its ultimate perfection.

Conclusion

So, in conclusion, one can perceive that our world and its creatures seem to be caught up in a system inexorably moving, with our participation, across the stage of history in the general direction of progress. It is this assurance that provides the underlying basis for my happiness today. Poetically speaking,

> As we look to the map of Earth's story
> Still unfolding through billions of years,

There's a pattern emerges, t'wards glory,
Midst the struggle, the carnage, and tears.

Our eloquent colleague of a recent age, Dr. Oliver Wendell Holmes, must have had a similar vision when he said: "To reach the port of heaven, we must sail sometimes with the wind and sometimes against it—but we must sail, and not drift, nor lie at anchor."

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