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PRESIDENTIAL ADDRESS

The Individual, Science, and Society

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The planning of the Presidential Address is an exciting as well as humiliating experience. In reading the addresses of one's predecessors, one finds much profound and often unremembered wisdom concerning most aspects of biology and medicine. These pleasures are counterbalanced by the fears that there is little room left for originality. We have heard it all before! When one contemplates returning to the precedent of starting the Monday meeting with a scientific report, relief is only temporary, since a talk on amyloid or heavy chain disease might raise serious questions about the criteria the president used in selecting the program from the many exciting abstracts submitted.

At one moment of desperation—after I had looked at the sketches that Dr. Mark Podwal, a former student of mine (now turned half-time dermatologist and half-time artist) had made to illustrate an early draft—I was tempted to dispense with words and to rely entirely on his pictures. The fear that this might be interpreted by the membership as dereliction of duty and, in our current political atmosphere, result in impeachment proceedings, made me stick to tradition. Perhaps the pictures by Dr. Podwal and the dedicated intellectual and editorial collaboration of my wife, Dr. Dorothea Zucker-Franklin, and a few close friends will help provide us with some novel insights into the importance of the individual in science and the steps we must take to preserve his role.

In these difficult times, clinical investigation and science in general face so many profound problems that

one can exercise a wide choice in picking a subject to discuss. My most recent predecessors have enumerated, bewailed, and on occasion, offered solutions to the many threats facing clinical investigation. Most of the obvious ones, such as the temporary curtailment of research funds, abrogation of training grants, stringent supervision of research in the guise of ethical control, and threats to peer review, serious though they may appear, are only symptoms of a much more profound illness affecting society. What undermines our well-being and gnaws at the very foundations of our institutions is a feeling of distrust: distrust among others of science and of the motives of scientists, suspicion of medicine, and unfortunately, of the motives of physicians. This sickness is subtle, difficult to define, and hence more disturbing, for it cannot be cured by simple measures, such as the release of impounded funds or the *pro forma* reinstatement of review panels.

About the turn of the century, Max Weber observed that "the belief in the value of scientific truth is not derived from nature but is a product of definite cultures", and the sociologist, Merton, has recently added that "this belief can be readily transmuted into doubt and disbelief" (1). Indeed, today a series of deceptions allows the seeds of doubt and disbelief to germinate. Corruption has been unmasked at the highest levels of government. Prevaricated oil shortages have mocked consumers waiting for hours at the pumps until prices had risen sufficiently to allow a sudden return to normalcy. Billboards of healthy, suntanned

cowboys cavorting in the great outdoors are designed to imply that their wholesome activities and the beauties of nature are related to the cigarette, when it is generally known that smoking is one of the major killers and pollutants of our time. Under such circumstances, why should the products of scientific investigation be taken at face value? To rephrase Weber's statement: a culture accustomed to deceit is ill-prepared to accept scientific truth. Alas, false promises and widely propagandized crash programs aimed at the cures of major diseases have also been used to advertise the benefits of research. Needless to say, the public, unaware that such programs are doomed to fail for lack of basic knowledge and well-defined tools, is left with the feeling that large sums of money have been dissipated for naught, and has been led to the erroneous belief that science must be better organized and centrally directed if it is to achieve its goals. Steps are being taken to tell us not only what we should do, but also how we should do it. It is my firm conviction that this approach may destroy the productive research community, and as a consequence, result in the stagnation of medical progress. To fully understand the possible effects which central direction may have on clinical investigation, let us first examine the principles underlying biomedical research and the complex factors motivating investigators to embark on a research career. Only then will it become possible to focus on the steps that we, as individuals and as a society, can take to reverse this destructive process.

What are the overall goals of the biomedical or clinical investigator? I believe that all of us are still primarily motivated by a spark of good, honest, adolescent idealism, namely the desire to understand and to cure disease. It is true that often we like to think of ourselves as pure scientists in an era when the contributions of molecular biology are judged supreme; but

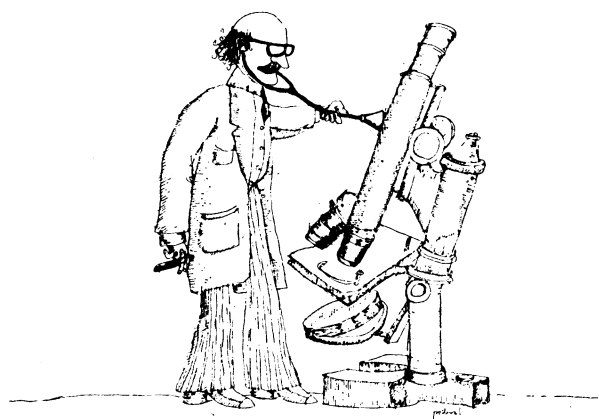


FIGURE 1 The clinical investigator—clinician or scientist?

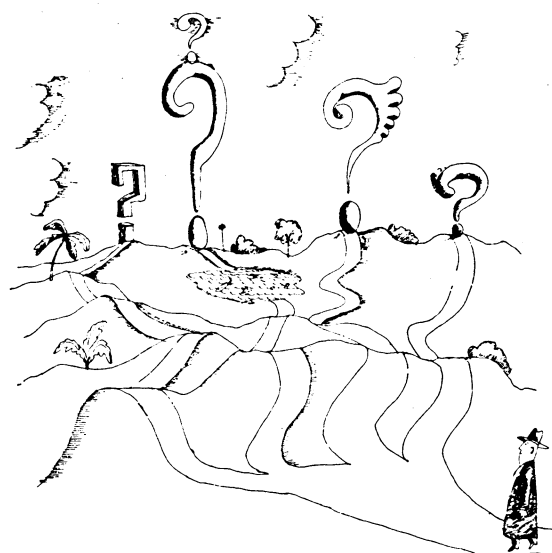


FIGURE 2 The path to achieve our goals is rarely direct.

in our laboratories, isn't reality more like what is depicted in Fig. 1? On a broader scale, we strive to enrich our culture "not only with technically important findings, but also with humanly significant ideas" (2). Unfortunately, as illustrated in Fig. 2, the path to these goals is rarely direct. Since the complexity of biology seldom allows a direct approach to the solution of problems, we are usually forced to grope, often blindly, for clues. Sentiments like these have led Jacques Monod (3), like others before him, to emphasize that "rational intelligence is an instrument of knowledge especially designed for mastering inert matter but utterly incapable of apprehending life's phenomena." Instinct and intuition serve as additional major tools in our quest to answer questions in the realm of living matter. Unfortunately, the public, and even many physicians who have not had the opportunity to participate in research, do not always appreciate the crucial importance of these intangible factors. Straight-jacketed centrally directed programs would leave no room for these essential ingredients.

Let us try to paint a picture of the implications of centrally directed research. One possibility, widely favored at the moment, would be the organization of panels of experts in a specialized area with instructions to identify important problems and then to outline appropriate programs for their solution. The next step would be to advertise and to solicit research protocols from individuals and corporations anxious to apply their efforts to these programs. Since each suggestion would assume an air of immediate urgency, such announcements would set off a flurry of activity by a horde of individuals, who would ultimately be in the

intellectual if not the actual employ of the scientific planners. They would in turn hire others to prepare reports on their diligent labors, most likely on complicated forms lending themselves to analysis by computers and efficiency experts, but baffling to any logical mind (Fig. 3). Science would be planned by the methods of systems analysis and future funding would depend on the completion of the prescribed work as judged by a new class of individuals who might be called "scientific coordinators". What could be expected from such a rigidly controlled system? At best, if by chance the initial premise were correct, it would yield answers to the questions posed, albeit through vast expenditures of energy and money. If past experience can serve as a guide, the areas chosen and the tools employed would be those currently in fashion, and there would be little likelihood of making an original discovery or developing a really novel concept. If the group of planners were less sagacious, or perhaps less fortunate, and if, for example, viruses were shown *not* to be the cause of cancer or cholesterol, *not* to be involved in atherosclerosis, we would at best come up with some information that might be applicable to another subject. Soon more and more of the funds would be channeled to docile intellectual slaves such as those shown (Fig. 4), who are willing to follow instructions. The truly creative individual would be a total misfit in such a system. The bulk of talent of the scientific community would be diverted from original thinking to piecework and many capable young individuals would choose other potentially more interesting professions, guaranteeing them greater independence and freedom. Are we beginning to see the first signs of this in the shunning of research by our most able students and house officers? Is there perhaps a greater opportunity for self-expression and independence in the area of "health care delivery", which is now eagerly sought by many of brightest young physicians?

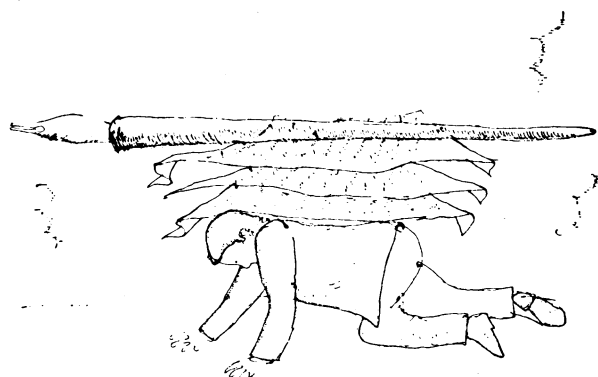


FIGURE 3 The monthly progress report—the nightmare of the investigator threatened by directed research.



FIGURE 4 Docile intellectual slaves following instructions from above.

To be fair, we must not deny the value of targeted research in occasional instances when the available basic information allows a direct attack on an important health problem, or when we wish to stimulate research in areas neglected because they are either obscure or unattractive. As all of us know, this is rarely necessary, since scientists, in their scramble for success and recognition, rarely leave interesting soluble areas unexplored.

An alternative approach being implemented at this very time is the creation of centers for the study of certain diseases. Superficially, this may seem somewhat less destructive, since the locations of such centers would be influenced to some extent by the intellectual talents already available. However, they would also be guided by the need for equal geographic distribution, the illnesses prevalent among the relatives of the legislators involved in their creation, and the pressures exerted by vested interests. Since any center worthy of its name would have to be mammoth in size, this approach would be likely to result in the support of mediocre projects riding on the coattails of the better ones, and would often force the investigator in search of funds to engage in intellectual acrobatics to fit his project into the program of the local center. Indeed, "the mass of mediocrity will displace the meritorious few" (4). An additional threat posed by this form of scientific support is the risk of creating yet another group of professionally powerful scientific administrators, liable to

upset the departmental structures and loyalties of the university.

If we agree that "the act of scientific creation, no less than any intellectual creation, is largely an individual act" (5), we cannot accept either of these two alternatives. Therefore, we must defend our belief in the time-tested process of investigator-initiated research, evaluated by peer review and funded solely on scientific merit, in which we "encourage the single scientist to be independent and the body of scientists to be tolerant" (6).

The major factors motivating an individual to embark on a career in research are curiosity, a desire to contribute to scientific as well as social progress, and a strong need for recognition and independence. One of the rewards is the satisfaction of having made a contribution which one can consider one's own and which receives appropriate recognition from one's peers. Banting (7) clearly enunciated this when he said "Our religion, our moral fabric, our very basis of life are centered around the idea of reward. It is not abnormal, therefore, that the research man should desire the kudos of his own work or his own ideas." Where else but in an atmosphere of free inquiry can one be sure that these drives are satisfied? Can either of the two centrally directed programs where bespectacled elders direct the activities of others have an effect other than to discourage and repel the young investigator?

In view of the unpredictability of science, there is no way of anticipating the future needs and organizing

the activities of scientists. If we agree with Medawar that "nearly all scientific research leads to nowhere, or if it does lead somewhere, then not in the direction it started off with" (8) (Fig. 5), we must conclude that there is no alternative to free exploration by the maximum number of inquisitive minds. It is often difficult to predict who will achieve success, since past performance allows one to choose among a group of proven productivity, but is of little help in picking the young scientist with the greatest potential. By leaving a place for the nonconformist, by permitting exploration of currently less fashionable areas, and by allowing maximum flexibility to follow up unexpected leads, we are much more likely to achieve major conceptual advances than in a system that is rigidly confined by concepts interpreted by the previous generation.

Moreover, while the fruits of medical research do not readily lend themselves to the usual cost-benefit analysis employable in many other areas of human endeavor, there can be little doubt that the dollar cost of "little science" is infinitely less and the efficiency much greater than that of "big science".

Another point to consider is that either form of centrally directed science is likely to aggravate the current trend of removing many capable individuals from the laboratory and sequestering them in offices in Washington or the local centers as a self-perpetuating, unproductive, scientific political elite. Would it not be wiser to redirect these talented individuals to the laboratory, where they can play an important role in their own research, and guide and formulate the careers of younger investigators?

Lastly, by permitting maximal flexibility and allowing work to be done for true rather than contrived reasons, we would encourage honesty of choice, prevent prostitution of principles and ideas in a frantic search for financial support, and safeguard the intellectual diversity which assures a proper climate for scientific inquiry.

What can we, as a scientific society and as individuals, do to prevent further inroads into a system which has been so eminently successful and which promises greater achievements at less cost than any other? How can we prevent this productive period from becoming another dark age in the ever-changing history of science? The task of restoring the supremacy of the individual is enormous. It requires the active participation of every member of the society and every clinical investigator. It cannot be delegated to our busy officers or the members of the National Public Affairs Committee, all of whom are transients chosen for their scientific and not their political expertise. That The American Society for Clinical Investigation is politically powerless is clearly illustrated by its history. It appears that the Society has only rarely expressed itself officially in a way that might be considered politically

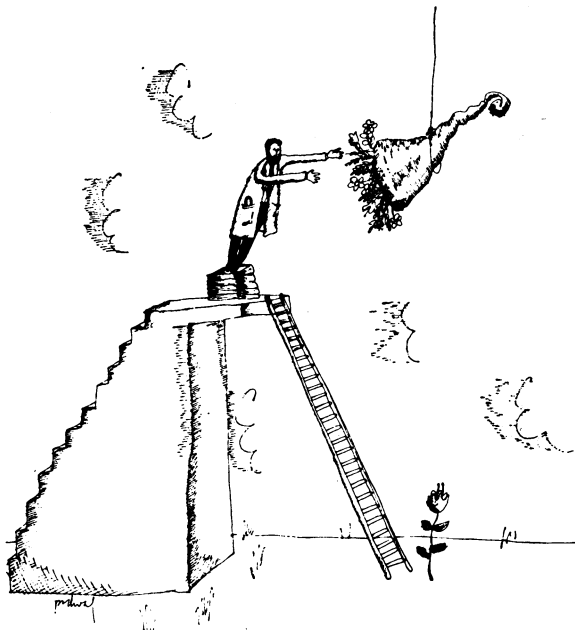


FIGURE 5 "Nearly all scientific research leads nowhere, or if it does lead somewhere, then not in the direction it started off with" (8).

significant. On the first occasion, it took the momentous step of offering President Woodrow Wilson its support during World War I. Shortly after, it passed a resolution for the prohibition of the manufacture and importation of alcoholic beverages to this country for the duration of the war. Obviously, this altruistic act was motivated solely by patriotic reasons, since the unavailability of such beverages must have inflicted untold suffering on the assembled members during their meeting in this glorious city. That things are not very different now is illustrated by two of my own experiences as president, which emphasize our political ineffectiveness. Earlier this year it was announced that the newly appointed Presidential Science Advisor had met with the officers of a number of scientific societies to plan the future of science in the present administration. My letter offering him the resources of The American Society for Clinical Investigation in planning for the needs of biomedical research was not even acknowledged. Yet in a way this "no response" was more gratifying than my second venture into politics. In reply to a letter highly critical of impoundment of appropriated funds and curtailment of training support, I received a most ingratiating letter from the President's Domestic Advisor thanking me for our support of the administration's health policy.

Under these circumstances, what means are open to us to reverse the deleterious effects of the last five years? The fate of medicine is at stake! In the first place, we must communicate clearly with every segment of society if we wish to play a role in planning for the future. Secondly, it is essential that we learn to make the best of our limited budget by directing the funds into what we consider truly productive areas. In addition, we must strive to maintain an environment which is so rewarding as to be irresistible to our younger colleagues.

I will not dwell on the need to interact with the legislative and executive branches of the government, since the means open to us and the chances for success have been proclaimed from this podium annually. Our case must be brought directly to the public. Mass education and modern information media have indeed raised the general public to a position which Alexander Meiklejohn has referred to as "the fourth independent branch of government". As pointed out by Ivan Bennett (9), "Science can no longer hope to exist among other human enterprises through some mystique, without constraints or scrutiny in terms of national goals, and isolated from the competition for allocation of resources which are finite." Therefore it is incumbent upon us to give an account to society! This can no longer be done simply by the casual process of talking to our patients and nonmedical friends. The public expects and demands more! We must enlist the help of the press and other communications media, which have

recently demonstrated their powers to mold public opinion. Techniques of instant communication and modern methods of information gathering, storage, and transmission have revolutionized the means available to educate society. Scientific data, like political issues or economic theorems, are not conveyed to the public by specialty journals, but rather by the lay press, radio, and television. Reporters and editors require our help to develop the public's insight into the workings of science and the value of research. By working with them to set the hopes and expectations of the lay public in the framework of the achievable, we will prevent disappointments engendered by false promises. Let it be understood by everyone that in spite of our strivings, cancer and heart disease will not be cured overnight, and the urgently awaited practical applications must await the understanding of the basic laws of biology. Most importantly, society must be made to understand that in our complex world, many of the intricate health-related problems which the medical profession is asked to solve are largely in the realm of social, political, and economic disciplines, and consequently far beyond our sphere of competence. We have to do our share in their solution, but cannot be expected to shoulder the whole burden.

Of equal or possibly even greater importance is the need to communicate better with the remainder of the medical profession, the 350,000 physicians who take our results from the *Journal of Biological Chemistry* and apply them to the patient. It is very disturbing that last fall, more than 50% of the letters from physicians to Congress favored abrogation of training grants. The clinical staffs of our medical schools and associated hospitals and especially physicians who are not affiliated with medical schools should be made to understand the importance of clinical research if we are to succeed in our common goal of improving health care. By enlisting the resources of practicing physicians in clinical research, we are likely to arouse their enthusiasm and interest and to dispel the commonly believed myth that the clinical investigator is the oddball who has chosen the easy life and who likes to sit sequestered in his ivory tower in search of abstract truth.

Above all, if we are convinced that clinical investigation is *the* major force in improving the quality of medicine, we must make certain that there will be clinical investigators in the year 2000. From their first day in Anatomy to the end of their residency, our students and house staffs should be exposed to individuals engaged in research. By deed more than by word, we must make them aware that significant advances in the scientific as well as the social arenas of medicine require complex programs by physicians, either together with basic or with social and political scientists. Since we seem to have passed the temporary period of students' unfocused hostility to organized disciplines, our



FIGURE 6 We must restore an intellectual climate which will bring our youth back out of the woods.

task should not prove difficult. There is no doubt that our youth, now as always, is genuinely striving to improve the health of society. Unfortunately, the current political, social, and economic pressures are diverting many of the most talented physicians from investigative pursuits. If this trend is allowed to continue, the practice of medicine will be arrested at its present stage of evolution. Yet we cannot hope to recapture the interest and enthusiasm of our brightest young people by appealing to their idealism alone. They will not return to the fold until we can make a career in biomedical research as challenging and attractive as it was in the last two decades, when completion of training virtually assured the young investigator of an independent laboratory, and above all, a chance to set his own goals. Perhaps, if we could restore this kind of climate, our youth would once again come back out of the woods (Fig. 6).

Though our national budget continues to increase annually, it usually slights those programs we consider most important. Consequently, we must resign ourselves to the fact that uncontrolled growth of science funding is a thing of the past. In attempting to put to optimum use the limited funds at our disposal and at the same time create an intellectual environment that will make a scientific career attractive, we should heed the advice of Gerard Piel (10) that "it is not the total amount of support that counts but rather the terms on which it is given." If we include support of the individual as an essential term in our contract with society, science will be enriched. By giving everyone the opportunity to evolve his own style, the final product will be greater

than the sum of its parts and the public will reap the benefits.

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