

PROCEEDINGS OF THE FIFTY-FOURTH ANNUAL MEETING OF THE AMERICAN SOCIETY FOR CLINICAL INVESTIGATION, INC., HELD IN ATLANTIC CITY, N. J., APRIL 30, 1962

PRESIDENTIAL ADDRESS

THE TRAINING OF THE CLINICAL INVESTIGATOR

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In this address, I would like to touch on a few facets of the intricate problem of training clinical investigators. During the past year the Society has received several requests from representatives of different branches of the Public Health Service for aid in the evaluation of the various training-grant programs as they apply to clinical investigation. Several discussions have been held with representatives of the Society with the expected result that no one could clearly define an optimal program of training for such a variegated individual as a clinical investigator. The question arose and of course will long continue to arise: Should clinical investigators train with clinical investigators or should they work with more basically oriented scientists during their training period?

However, before going farther, I would like to tell a little of the story of Doctor Brightfoot. He was a most highly trained doctor, senior resident in medicine at the main teaching hospital attached to Harvumbia Medical School. His special forte was new steroid hormones and none could rival him in his knowledge of their dosages. Naturally, he became curious about their mechanism of action, but unfortunately he was far too busy in the conscientious pursuit of his hospital duties to even consider attempting any experiments. Suddenly, in a moment of exhilaration, he made the momentous decision to go into clinical investigation and tackle the steroid problem so dear to his heart. Of course he was no little swayed by an innate conviction that "research accomplishment is the royal road to academic success." His joy knew no bounds when he was accepted as a research associate at the Federal Institute for the Preservation of Health. There was no longer any doubt in his mind; he was determined to become an academic medicine man. The day finally arrived when he tried his first experiment in the laboratory. Many were his frustrations, and how he wished he knew more chemistry, or even as much as he had once known. It soon became apparent that all he needed was more basic training in enzyme chemistry. He was with too clinical a group. So after two years he left and went back to the biochemistry department at his own medical school, where he was given the problem of purifying the enzyme hydroxymethyl deoxycytidine monophosphate kinase. It was a slow process but he stuck it out because he felt he was really learning enzyme chemistry. Eventually he ended up in a joint appointment with the department of medicine, but by now he knew much more about kinetics than corticoids. Things looked rather bleak after some five years of such

combined activity and it gradually dawned on him that he was not really cut out to be an investigator. Fortunately, rescue did occur when he was suddenly appointed director of a small new Institute for the Study of Cancer, Arthritis, Arteriosclerosis and Allied Disorders (the latter referring to other diseases sponsored by wealthy foundations). He was now content—he had found his calling—he had become an administrator, which of course is where (according to Parkinson's law) he would have ended up anyway, even if he had been a good investigator. So what did it matter?

Unfortunately, this little tale is not pure fantasy but a sequence of events observed not infrequently in the area of clinical investigation. The great tragedy in it is the loss of highly trained physicians from vocations where they are urgently needed. It has been estimated that the training of a good physician cost something of the order of \$50,000. This large sum, which represents only tangible costs, plus the added expense of special training, emphasizes numerically the tragedy involved when the end result is simply a poor investigator. Then there is the important question of the shortage of scientific manpower, which is exemplified by weekly advertisements in *The New York Times* for mathematicians and physicists (up to now there has been none for clinical investigators). This is reflected in the alarming fall-off in the number of applicants to medical schools, and makes it all the more imperative that the medical school commodity be put to the right use.

With so much at stake, it would seem of the utmost importance that the skilled physician should have some evidence of an aptitude for investigative work before taking the drastic step of enrolling in a prolonged plan of training in so different an area. Whenever possible, this should be ascertained at an early period, preferably during the resident training period or even in medical school. Perhaps greater freedom from an oppressive duty load during the house officer training period, as is frequently advocated but rarely enforced, would represent one way to permit the inquiring individual an earlier opportunity to test, at least in a preliminary way, his inclinations and even fitness for the research alternative. Interest and enthusiasm are scarcely sufficient without other attributes for a truly successful career in clinical investigation. Few individuals possess the insight to admit to ineptitude, especially since proficiency in this area is so intangible. It is too easy to justify failure with plausible reasons such as the vicissitudes of research work

or inadequate training. Scientific inquiry is a sort of opiate that once experienced is not readily shaken off, particularly if the individual has tasted what has been termed "the Elysian delight" of observing something new.

The competitive criteria generally regulating advancement in most scientific fields are not so clearly operative in the area of clinical investigation, particularly in the present climate of plentiful funds and expanding clinical research centers. Sufficient opportunity exists to encourage even the poor investigator to persist in his course at relatively little self-sacrifice. In the long run, the burden of responsibility for the important decision of whether the young man stays in clinical investigation must fall primarily on the shoulders of the established investigator who has observed him in action. This very difficult yet essential assignment requires considerable thought and might well be considered an obligation to the young associate, although help and advice on this question are rarely sought.

There is no doubt that a place will always remain for the untrained individual with ingenuity and keen observational ability. It is almost stating a truism to say that these talents can never be replaced by simple experience with highly specialized techniques. However, neither should the latter be avoided. The British geneticist, Darlington, has recently presented a strong indictment of medical training for failing to provide the foundation for understanding the advances in biology, and he cites an example as follows: "Chromosomes which have been understood in agricultural research for forty years made their debut in medical research only four years ago—and, as far as medical teaching is concerned, the chromosomes still exist only on paper."

Many of our distinguished predecessors in this Society availed themselves of opportunities to work with prominent scientists abroad for variable periods of time after their clinical training. This has become less popular in recent years but still remains a valuable opportunity, particularly in certain fields. In most instances the young physician can readily find the facilities for further basic training within the confines of his own university or medical school. Our research institutes can also play a useful accessory role. Theobald Smith once stated that each new generation of "research workers must have more diversified training than the older generation possesses." Can this be acquired by physicians working solely in clinical investigation laboratories? Facts are continually accumulating in many branches of science and in obscure areas that have application to human disease but which are unfamiliar to most of the present generation of clinical research workers. Our training and background do not permit us to see or appreciate their relevance, and it is highly desirable that the young investigator have an opportunity to explore at least a few of these areas during his training period.

In addition, there is an element of selfishness in this era of large groups and teams where the project represents the first consideration and the training of the young member much the second. The attitude that what is good

for the project is good for the younger individual in it is not uncommon. With the effective sterilization of our selected best investigators by a continuous series of committee meetings, conferences, and symposia, an ever increasing responsibility for actual investigative work falls to the junior members of the research team. All too frequently they do not represent co-workers acquiring experience and training, working shoulder to shoulder with the established investigator, observing his approach, technique, and fulfillment of a problem. Instead they are hard workers struggling on their own, and this is important, not with their own approaches but with the projected plan of the senior investigator. He still manages to find the time to fill the junior worker with ideas and schemes and then to report the experimental findings at select conferences where the junior member, unfortunately, happens not to be invited. This of course is an exaggeration, but the key question that must be faced is: How often is the senior investigator prepared to advise his junior associates to leave their essential position on his team and seek more basic training in laboratories which might furnish them with new, difficultly acquired techniques and fresh perspectives to apply to clinical problems?

There are of course a number of dangers that arise in the instances where very thorough grounding in the basic sciences is undertaken. Perhaps foremost of these is the very real problem of the almost invariable sacrifice of proficiencies in clinical medicine which remain such an essential ingredient of the clinical investigator, at least in the classical sense. Much has been said on this point. There is also little doubt that clinical investigation needs at least some basically trained individuals. Perhaps ideally it should encompass a whole spectrum of investigators operating at various distances from the bedside.

Another very real danger is that the physician undertaking prolonged basic training may be lost completely to clinical investigation. He may well become so enamored of fundamental problems of biology as to forsake entirely his disease orientation. In addition, he almost certainly will encounter the rather widespread disparaging attitude of basic scientists toward clinical investigation which dampens the original appeal of a career in this area. Such individuals, particularly those participating in various postdoctoral Ph.D. programs, are in considerable competitive demand from various branches of the preclinical sciences where they frequently end up in important positions, all connections with clinical investigation severed. Perhaps this is an overstatement; one link with clinical investigation often does remain and that is membership in this Society.

Here then, to digress for a moment, is one of the factors behind our current Society dilemma. These individuals and other full-time research workers, perhaps somewhat less removed from clinical investigation, represent an ever expanding group. Membership in the Society is readily gained under the present system where research accomplishment is the dominant criterion for admission. However, the important point is that it is gained at the expense of the classical type of clinical in-

investigator who is involved in patient care. Under our present fixed quota system, someone must lose out. It is imperative that steps be taken to prevent this selective action on the more clinically oriented individuals who in the past have represented the backbone of the Society. The most ready remedy, although no solution, is to support the proposed increase in membership.

There is one final important point regarding the education of the clinical investigator about which relatively little is heard. This concerns training in what might be termed the philosophy of research and involves such diverse questions as scientific discipline of thought, intellectual integrity, the sanctity of the written word, and even the ethics of research work. Somehow, medical

training does not regularly inculcate upon the investigator the basic principles involved in these more esoteric questions. Their acquisition is often a slow, difficult process accomplished primarily through bitter experience, and others must suffer while the young worker learns by his mistakes. It is an area where the physician most certainly requires development, and this then marks his transition into a scientist. Irrespective of the type of training program adopted by a clinical investigator, be it in part-time clinical research or in basic science laboratories, or perhaps ideally in both, strong consideration should also be given to the acquisition of this other, most essential type of education.