Remarks of
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Introduction

I am delighted to participate in this special convocation.

A very long time ago when I traveled with my parents from our home in Dayton to Springfield where my Grandmother lived, this campus site was -- as I remember it -- an open field. It's startling to return and discover that here -- in less than twenty years -- an aggressive distinguished university has emerged.

I congratulate the State of Ohio, the University President and his staff, and -- above all -- I congratulate the faculty and students at Wright State for building, at this place, an institution of great excellence and service.

I must -- however -- file one mild complaint. My disappointment was intense when upon returning after all these years, I discovered that the "Gem City" still has not marked my birthplace on

Catalpa Drive with an historic plaque! And I suspect that by the time this speech is over the odds in favor of such a monument will have dramatically declined. I have grown accustomed to acts which keep one humble as Commissioner of the Office of Education.

I

Even so, I am pleased to be with you today. Not just because Dayton is my home, but also because the new Biomedical Science Ph.D. program we inaugurated today places Wright State at the very center of an academic health care revolution. I am convinced we do face a revolution in health-related education and research, first because of the explosion of new knowledge and the emergence of new disciplines.

When young men prepared for medicine 200 years ago, "apprenticeship" was the basic training pattern. These would-be doctors were indentured to reputable physicians -- and the "learned by doing."

In the early 19th Century some formal education was introduced and between 1810 and 1840, 26 new "medical" schools sprang up across the land, and between 1840 and 1876 there were 47 more.

But these new schools were light years from what we know today. They were private profitmaking ventures -- outside the higher

learning institutions. These so-called medical schools had no equipment. The teaching was didactic, and no applicant who could pay the fee or sign a promisory note was refused admission. In those days, state boards in medicine did not exist and a school diploma was all the student needed to qualify to practice.

By the late 1800s there was a dramatic shift. Science was beginning to take root. The University introduced the new disciplines of chemistry, biology, and physics. And for the first time medicine and the academy seriously joined hands. Grades were introduced, state boards sprang up, clinical experience started to emerge, and medical training became less deductive and more academic.

But the quality of health care training in this Nation still was most uneven. And at the beginning of the 20th Century when Flexner conducted his now famous study of all 155 medical schools in America and Canada, he concluded that only one school in the Nation -- John Hopkins -- met the necessary standards. This blockbuster report shook up and reshaped medical education for over 60 years. Medicine and the university became full academic partners, and 95 percent of all students going on to medical school today follow a pre-med pattern proposed by Flexner over 60 years ago. And because of these reforms, health care in this Nation has been enormously enhanced.

But this brings me to my central point.

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I believe a new post-Flexner era has begun. Knowledge has dramatically expanded, and we must have new academic programs to reflect this essential fact. The truth is that our "so-called" disciplines are all somewhat artificial. We have "broken up" knowledge into "little academic" boxes -- not because reality is so fragmented -- but because we ourselves cannot comprehend everything at once.

Sir Karl Popper, the distinguished Austrian-born British philosopher, reminded us that: Disciplines are distinguished partly for historical reasons and for reasons of administrative convenience, and partly because the theories which we construct to solve our problems have a tendency to grow into unified systems. But all of this classification and distinction, he said, is a comparatively unimportant and superficial affair. We are not students of some subject matter but (we are) students of problems. And problems, he observed, cut right across and transcend the traditional borders of what we call the disciplines.

That's the central point of the new health training revolution. Dramatic new theoretical discoveries in chemistry, biology, and physics have created exciting new interdisciplinary fields of inquiry which are enormously useful to the health profession.

Alexander Leaf writing in the Macy Foundation Report on the Changing Medical Curriculum said that:

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> The bioscience disciplines which twenty years ago were of interest only to medicine now have become a more general part of the life sciences. And the health sciences have moved into new frontiers.

These new disciplines -- Leaf observed -- include: immunology, developmental biology, viral oncology, genetics, neurobiology, social psychology, and bio-ethics -- just to name a few.

Here's the point.

New fields of knowledge have emerged which build upon and extend the traditional disciplines of the past. Increasingly, wholeness -- not the fragmentation of knowledge -- has become our central goal. And this commitment calls for the new kind of academic programs we inaugurate today.

II

We also face a revolution in health training because of new technology.

The New York Times -- several weeks ago -- described the "engineering" miracles that have changed the face of health care in this Nation.

At Rockefeller University and New York Hospital an experimental "artificial pancreas" can instantaneously measure glucose levels, and it can adjust the amount of insulin fed into the bloodstream of "selected" diabetic patients to prevent wild fluctuations.

Experiments with sophisticated electronics at the University of Utah and New York's Columbia Presbyterian Medical Center have meant sight for the blind and hearing for the deaf.

At National Institutes of Health a complicated technique used in Chemistry called nuclear magnetic resonance can track the chemistry of living cells. Using this technique, researchers hope to detect changes in heart muscle cells before a heart attack occurs and they also hope to detect early rejection of transplanted organs.

The Computerized Axial Tomography (CAT) Scanner is a marvelous "imaging" device closely allied to ultrasound. But unlike "ultrasound," the CAT Scanner uses a battery of X-rays to take a cross-sectional picture -- a tomogram -- of the patient's body. Then computers put the millions of bits of information together in a clear picture on a computer screen. In many cases, the CAT Scanner has already replaced other forms of diagnosis. Instead of having to inject air into the brain, for example, doctors can now obtain an even clearer view of a suspected brain tumor with the Scanner.

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And today microsurgery is one of our most important breakthroughs. Microscopes can now magnify nerves and blood vessels up to 40 times. These powerful microscopes also can project the action on television screens so other members of the operating team can watch. Also because of magnification -- surgical thread is now so thin it is practically invisible to the naked eye.

And computers also have revolutionized the diagnostic process. The Myo-Cardial Infarction data base, for example, has -- in the computer -- the characteristics of several thousand patients with acute Myo-Cardial Infarctions. The physician can, on a twenty-four-day basis, call in from a computer terminal. And the data of the patient can be matched with the cumulative experience of the group. This means that in the middle of the night, the physician does not have to rely on memory, or an old textbook, or publication of an article that often is outdated before it appears in print. The physician has, quite literally, at his fingertips all there is to know.

Your new biomedical sciences program is on the cutting edge precisely because it is jointly sponsored by the College of Medicine and the College of Engineering, fields of study which lead this revolution in technology.

III

Finally we face a health care revolution -- not just because of new disciplines and new technology -- but also because of new professions in the field.

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Not many years ago a single physician lived near his patient. He was the health care "team" and he knew his patient very well. In this "system" the doctor often wrote down very little but, because of the close relationship, he often kept a full social, psychiatric, and medical history in his head. Further since scientific knowledge was much more limited and much less precise, there were few, if any, specialists involved.

As knowledge grew, doctors specialized and patients now confronted several different doctors. These new "specialist" physicians, radiologists, for example, gave the patient so-called backup support. And the specialists themselves were supported by a backup team -- pathologists, biochemists, and others. And finally each field developed "ancillary" medical personnel, and by now a single patient was being treated by a virtual army of specialists he had never met.

It was inevitable that -- with this complicated web -- a problem of coordination would develop. The cardiologist, for example, might prescribe a drug not knowing that his drug was being antagonized by another drug given by the psychiatrist; indeed, he may not have known his patient was a psychiatric patient. Even if he had, however, because of the sheer mass of medical detail, it is unlikely that either physician would have been aware that the two drugs antagonized each other. To make matters worse, a given patient -- because of increased mobility -- may not see a given doctor, nurse, or medical worker very long.

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We are left with what Le Corbusier described as "a spectacle of fragmentation of intention."

William G. Analyan put it still more harshly. He said that today we have chaos in the field with over two hundred different types of persons who can be broadly classed as providers of health care. They range all the way from the telephone operator to the physician working with many other health professionals. The Institute of Medicine in HEW estimates that it will take them until 1985 to sort and define the roles and responsibilities of all of the nonphysicians and other health professionals who are working in the field.

My point is not to headline the confusion, rather I want to underscore the fact that health care has become a very complicated business. Today, as your own brochure vividly describes, a single medical problem -- a spinal cord injury -- brings together a large and complex team.

The biochemist to study enzyme and cellular activity.

The biomedical engineer to devise ambulatory aids.

The chemist to analyze synthetic compounds used for treatment.

The neurologist and neurosurgeon to diagnosis and treat the neural damage.

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The pharmacologist to recommend drug therapy.

The physical therapist to rebuild residual functions.

The psychologist to help rebuild confidence and hope.

And on the far frontiers, we have profound social and moral and ethical questions.

Where are the "safe limits" of contamination of the air and water?

When does life begin and when does it end?

How can drug safety be improved?

Where will we get our food and how can nutrition be advanced?

And the list goes on.

I am convinced your Biomedical Sciences program can confront these transcendent problems and give new meaning to the fragments of our knowledge. In the past, medical education focused often on disease -- rather than on health -- and disease is a fragmentary process. This new program of research which you launch today will cut across the disciplines and look at the relationship of environment and health technology and health sociology and health ethics

and health. Because of your research we can improve not just the Nation's health but the quality of our lives as well.

Conclusion

Dr. Lewis Thomas -- author of Lives of a Cell and a Trustee of the Memorial Sloan-Kettering Cancer Center -- said recently that "these are not the best of times for the human mind."

> "All sorts of things seem to be turning out wrong," he said, "and the century seems to be slipping through our fingers here at the end, with almost all promises unfilled.
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> "I cannot begin to guess at all the causes of our cultural sadness, not even the most important ones. But I can think of one thing that is wrong with us and eats away at us: we do not know enough about ourselves.
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> "We are ignorant about how we work, about where we fit in, and most of all about the enormous, imponderable system of life in which we are embedded as working parts . . . It is a new experience for all of us, it's unfamiliar ground.
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> "Just think, two centuries ago we could explain everything, out of pure reason, and now most of that elaborate and harmonious structure has come apart before our eyes.
>
> "We are dumb."

Dr. Thomas' appeal is an eloquent one: It is a plea for more perspective and that -- it seems to me -- is precisely what your Biomedical Sciences program is all about.

I congratulate the students who have enrolled in this pioneering program and thank you very much for inviting me here today.

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