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RESEARCH AND THE INDIVIDUAL[1]

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THIS is a worthwhile occasion. Twenty-five years go the North Carolina Chapter of the Society of he Sigma Xi made its appearance at this university. The chapter was installed on the evening of May 6, 920, under the national presidency of Professor C. . McClung.[2]

This anniversary occasion is enhanced and made specially appropriate by the fact that during the present year the University of North Carolina is in the process of celebrating its sesquicentennial. During this period of one hundred and fifty years the university has cause to rejoice in the scientific accomplishments and trends which it has given by thought through research to the nation and areas beyond the seas.

A review of the Scientific Bibliography[3] of the university since 1795, prepared some years ago by Mrs. C. Dale Beers, of the Department of Botany, impresses one with the sincere interest which instructors at this institution have had in gaining understanding of a scientific order, of the physical difficulties which must have beset such investigations and the will within

[1] An address on the occasion of the twenty-fifth anniversary of the founding of the North Carolina Chapter of he Society of the Sigma Xi, June 7, 1945.

[2] Wm. deB. MacNider, "Sigma Xi. Half-Century Record and History 1886–1936." North Carolina Chapter, . 716. Free Press Interstate Printing Corporation, Burngton, Vermont.

[3] Alma Holland (Mrs. C. Dale Beers), *Jour. Elisha Mitchell Scientific Society*, 50: 303, 1934.

such men to live at a level of university understanding through research. The desire to understand the unknown and the will and sacrifice to gain such information is the spiritual inwardness of university life. Such a spiritual inwardness of poise and satisfaction has enabled this life to persist during periods of neglect and the transitory upheavals of educational reformers. Curricula come and go through changes in an attempt to meet an expanding knowledge and educational emergencies of an applied order. Their binding power to reality as they change is only assured through the accomplishments of research. Through it they may find a foothold of factual surety upon which they may rest and to which they may tie. Such research may keep the workshop order of education from becoming a sweatshop type and may, through biological time, helpfully relate the "New Deal" to an ever-changing social environment.

Here in Chapel Hill at our university we take justifiable but never boastful pride in the fact that with the commencement of its being, when a classical order of instruction was usual, certainly the natural sciences were given an important place in the plan for instruction. Joseph Caldwell, the first president of the university, was born in 1773, graduated from Princeton when only 18 years of age and came to Chapel Hill as professor of mathematics at the age of 23. At the age of 31 he became president of the university.[4] In 1824 the trustees of the university gave him $6,600 with which to go to Europe and purchase books and laboratory apparatus. It appears this money was about equally divided between these two sources for purposes of instruction.[5,6] The equipment was chiefly astronomical instruments and consisted in a meridian transit, telescope, a refracting telescope, an altitude and azimuth telescope, a good clock, which is now in the office of President F. P. Graham, a sextant, a Hadley's quadrant and a portable reflecting circle. Certain of these instruments are in the keeping of the Department of Physics and are in some measure usable. The spending of approximately $3,300 by this institution for scientific instruments in the year 1824 gave physical expression of the university's concern for science. This interest has persisted with the years. President Caldwell's interest must have exalted itself into an enthusiasm, for in 1830–31 he caused to be constructed at his own expense, to the amount of $430.29½, at a site near the university campus, a brick astronomical observatory. This was one of the first, if not the first, building erected specifically for astronomical observations in North America. The first recorded use of such instruments was made by Bishop James Madison at the College of William and Mary. In November, 1780, he sent to David Rittenhouse, of Philadelphia, observations on the eclipse of the satellites of Jupiter.

This forwardness in and appreciation of scientific research has continued at the University of North Carolina, not as an organized and regimented undertaking, but as an essential part of the durably satisfying life of the institution. It has asserted itself as a success in the silences through the toil of instructors and a limited number of students who have been willing with a relish to give up certain transitory incidentals and become fastened to learning through investigation. A monastic order of life has not encased such individuals and yet in the simplicity of the lives of certain of these men, in the sparse equipment of their workshops, this order of devotion has shown itself. This is as it should be. Thoughtfulness, which is the touchstone for any research, for the development of a plan to test the truthfulness in the thought, encounters certain difficulties in the hum of a laboratory organized for the mass production of this commodity; research, for immediate results. Such a rush of fulfilment may come later and be effective, but the commencement of such things relishes the quiet room and a peace which permits inquisitiveness. Such a concept has nothing of arrogance or superciliousness in it. It is not in favor of that order of individual who cares

> . . . to dwell remote, aloof
> In some high mansion, built on Wisdom's hill;
> Thence watch the errant crowd go to and fro,
> Matching their wits, striving for precedence,
> Toiling and moiling, hurrying night and day
> To rise to fortune and possess the world.
>
> —Lucretius, ii. 7.

It would, however, emphasize the value of detachment for thought of a logical and analytical order and the deep and lasting satisfaction which may come through discovery made possible by self-denial and toil in the silences in order "to strive, to seek, to find and not to yield."

Research-mindedness is a quality an individual must possess to further his inquisitiveness and gain information by investigation. Just how this order of mind is acquired and developed is difficult to determine. Likely through heredity, as has been the case with the Darwins and the Haldanes and other families, a few individuals are born with it and as their academic training progresses, it becomes of their nature not to be satisfied with the statements of others but to doubt, to inquire and be willing to express such misgivings by tests which they can put into operation in order not only to satisfy their own curiosity but in the hope of being able to add something to a given domain of

[4] Prior to Caldwell's presidency the administration of the university was in the hands of certain members of the faculty, designated "Presiding Professors."

[5] Willis I. Milham, "Early American Observatories." Williams College, Williamstown, Mass., 1938.

[6] Samuel Alfred Mitchell, *Proc. Amer. Philosophical Soc.*, 86: 13, 1942.

knowledge. Investigators by such a nature are the exception. In general such people are made, not just born, and the commencement of their research-mindedness may be due to a something they receive from one or more instructors. Such an instructor is the university order of teacher, without which there is no university. By the technique of his approach in gaining understanding as well as by his life, he likely all unconsciously gives that spark to a student which, fanned by the student's zeal, becomes the light which guides and leads him along pleasant but difficult paths of discovery. He follows these paths freely as an individual and not as a cog in a mechanized unit. For a few, there may be in store some outstanding discovery which will bring with it immediate recognition but for the average individual lost in research, concerned perhaps with the infinitesimally small, these signs of recognition may not come with such a readiness. The research-minded order of scholar finds a deeper satisfaction than surface recognition in the realization that no matter how small his discovery, he has taken his place forever in a composite oneness of understanding by finding a fact regardless of its minute or expanding nature. This order of inward satisfaction sustains and makes content the life of the research individual. It is a communal feeling of this nature which should hold the members in each chapter of the Society of the Sigma Xi and make them, as was the intent of its founders, "companions in zealous research." Progress in research can only come about through the activity of this order of free individual who has a thought and proceeds to follow it. The ability to follow it in its many ramifications depends primarily upon the individual's energy and specialized training. But all too often the nature of the problem fails to confine itself to one category of understanding, the division in which the investigator has had his training. The problem wanders from one area of understanding to another as it seeks to express itself perhaps as life. Group research becomes necessary. Individuals of varied disciplines must come together in order to unravel a variety of complexes which make up the problem as a whole. The structural biologist requires a biochemist, and the biochemist the chemical physicist. The agents of research in such groups must retain their individuality. Should this become lost, the completeness of the research project will fail to find its end reaction and—of even more significance—chance observations, leads, which may be of more importance than the original problem may be overlooked.

The concept of research as an individualistic expression of thought is not in conflict with mass production through research. Such composite research endeavor is necessary for industry and it may be obligatory for life as has been recently demonstrated in such a superb fashion for penicillin under the guidance of the Office of Scientific Research and Development of the National Research Council. Even in this instance, the great discovery which made necessary group activity came from one individual who made an observation and, of most importance, had a thought.

In order for thoughts arising through reason to express themselves by research, the trained individual requires money for his livelihood and for his investigations. But not too much money. Such an agent finds a sufficiency of life outside of the laboratory in rather simple and not too costly adventures. Too much money may separate this order of mind from its labor through the intervention of assistants. A process of weaning commences from the peace and poise of the laboratory to those things secured by money, often only of transitory interest and which lack values of enduring satisfaction. A satisfactory living and a fairly adequately equipped laboratory are necessary for sustained effort. Above all, for that peace of mind which is essential for work and the protection of a family, the certainty of fair compensation when the work days grow shorter and the evening shadows begin to lengthen. Parts of this statement may sound more romantic than real. There is a modicum of sense in it. Much money and those things which it can purchase can only be used and with difficulty enjoyed in an environment strange to and other than the laboratory. The sustaining charm of thought and discovery are in truth masters of the laboratory, and these are of their nature opposed to luxury and are self-sufficient. They partake of naturalness, that difficult-to-obtain and illusive attribute of the human being. This order of research-minded individual finds, as did Lessing, and as demonstrated by the life of Professor John J. Abel, that

> the value of a man is not measured by the truth he possesses, but rather by his sincere effort to discover truth. For it is not through possession of truth, but much more by search for it that his powers are widened, those powers which conduce to evergrowing perfection. Possession makes for tranquility, laziness and conceit. If God, holding in His right hand the complete embodiment of truth and in His left the unswerving and ever-alert search for truth, even though this search be frought with a constant and unremitting erring, should say to me "Choose!" I would humbly embrace His left and say: "Father, give! for the real truth is Yours alone."

And now may I say to the initiates of this evening, as we proceed with this celebration of our twenty-fifth anniversary, that we welcome you, both heartily and earnestly, as research individuals into this company of scholars—The Society of the Sigma Xi.