BIOCHEMISTRY

Harold Klosterman, Chairman

The Biochemistry Department had its roots in the Agricultural Experiment Station and provided the chemical services used for crop and livestock production research. A small amount of teaching was done during the decade 1946-1956. Beginning in 1957, there was a recognition of the larger role that biochemistry should play in both research and teaching and there has been a steady growth in personnel, research and teaching activities. Research facilities were remodeled in 1957 and 1960, and in 1964 the laboratories were expanded when Dunbar Hall was completed.

Traditionally, the research program in Biochemistry has been supported and administered through the Agricultural Experiment Station. The instructional program has been administered through the College of Chemistry and Physics (1957-1973) and since then, through the College of Science and Mathematics. This dual administrative structure has made it possible for the Department to participate in the research program of the Experiment Station and meet the need for biochemistry in the instructional program of the entire University community. In 1957 the instructional program consisted of a single three-quarter upper division course which attracted 10-15 students per quarter. In the intervening years there has been a gradually increasing demand for biochemistry courses from the life and health science disciplines. In recent years the instructional program has reached approximately 200 students per academic quarter. This increased instructional activity has been accompanied by a substantial diversification in types of courses offered at both the undergraduate and graduate levels and the development of a doctoral program leading to the Ph.D. with a Biochemistry major.

This increased instructional program has required the services of additional faculty members. In 1957 the instruction was given by a single faculty member and in 1978 seven faculty members are involved in the teaching program.

The increase in interest in biochemistry during the past two decades has resulted in an increase in cooperative programs with the United States Department of Agriculture in the area of biochemistry. The first interactions began in 1958 with a research contract to study the composition of linseed oil from all of the known varieties of flax seed. This led to the establishment of a research chemist position supported by the Crops Research Division of the USDA for the purpose of investigating the biochemistry of oilseeds. The success of these studies encouraged the addition of a technician position in 1968 and a second research chemist position in 1977, all supported by the USDA.

There have been other noteworthy long-term interactions with the USDA research biochemists. Biochemists from the USDA Metabolism and Radiation Research Laboratory have been adjuct professors in the Biochemistry Department and have been advisors for graduate students in biochemistry, offered specialized courses and presented seminars in bioc[1] emistry.

The research program in Biochemistry has broadened considerably over the past two decades and includes studies on the chemistry and biochemistry of plants, animals, insects and microorganisms.

Plant biochemistry has long been a major area of study. These studies include comparative biochemistry of healthy and diseased plants, nucleic acid metabolism, pollen sterility and the characterization of plant components. Various phases of the chemistry and biochemistry of the flax seed, linseed oil and linseed meal have been an important area of research for many years. These studies have led to a better knowledge of linseed oil formation in the seed; the chemistry of the oil; biochemical changes in the germinating seed and non-destructive rapid tests for oil determination in flax, sunflower and other oil seeds. In the course of these studies several new compounds were discovered, including a vitamin B_6 antagonist; several new glycosides; an intermediate used for sterol synthesis; a new type of cyclic fatty acid; and a plant growth hormone. Along with the discovery of these substances the biochemical changes that lead to the formation of these novel compounds have been discovered and described.

Another major area of study has been concerned with residues of pesticides. Studies have discovered how certain pesticides or other man-made chemicals are decomposed in plants, soil and water or by sunlight to harmless substances. Other studies have led to the determination of the amounts of pesticides that are found in crops following field application. These findings have been used to obtain label clearance for use of pesticides on a variety of crops.

A third major area of study has been in mammalian biochemistry, particularly in the biochemistry and metabolism of the thyroid gland in the cow. This has led to new information about the processes by which iodine is incorporated into the thyroid hormones. A new area of study was initiated this year which we hope will shed new light on the processes which regulate carbohydrate metabolism in heart tissue.

A fourth major study is concerned with the internal structure and composition of enzymes. Using the techniques of nuclear spectroscopy and fast reaction kinetics it has been possible to define some of the changes that occur in enzymes as the various enzyme catalyzed reactions are executed.

Through collaboration with the adjuct faculty in the USDA Metabolism and Radiation Research Laboratory we have probed into the biochemistry of the insect cuticle — the outer surface of insects. Other collaborative studies have reported how plants convert pesticides, especially herbicides, when these are applied in the field and what happens to the pesticides when animals eat treated crops.

The progress and findings in the research studies are best summarized in the 210 technical reports, 25 Doctoral theses and 36 Master's theses that have been prepared over the past two decades. Each of these reports and theses relates some phase of progress on an Experiment Station research project.

The progress in the development of the research and teaching programs in Biochemistry has been achieved through the close cooperation of the Agricultural Experiment Station, the various academic units of the University, including the College of Agriculture, and the United States Department of Agriculture. This close cooperation has made it possible for a sharing of the talents and knowledge of a limited number of scientists who, in turn, share in the use of research and teaching facilities which have been provided jointly by the cooperating units. A large measure of credit for this harmonious working relationship is due to the skillful administrative leadership provided by Dean and Director A. G. Hazen.

H. Goetz, Chairman

BOTANY

One beautiful morning in late June of 1952 a group of nine persons was gathered around a small plot in the middle of a field of grass near the road leading to the Dickinson Experiment Station. Some were kneeling over the plot; others had their heads bent downward in a seeming attitude of reverence; one was speaking quietly and earnestly; all were attentive. Obviously the occasion was one of importance. A car stopped on the road, the door slammed, and a stocky gentleman of youthful but thoroughly competent appearance approached the party through the grass.

What he saw when he reached the place where the group was gathered was not a wake for the deceased, but rather a small block of grass enclosed in a 1' x 3' metal frame, and the kneeling individuals were busily counting the number of stalks of grass within the area delineated by the frame. Dean Hazen was witnessing for the first time some of the work of the Botany Department in grass and range management being done at the Dickinson Station. Obviously what Dean Hazen saw that morning so long ago was a student training session in identification and enumeration techniques used in grass and pasture