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Guest Column



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Chairman

Biochemistry Department

Research and teaching in biochemistry are concerned with the molecules which are produced and organized to produce the living cell. We ask questions such as, "What molecules are found in various types of plant, animal or microbial cells? How are these molecules formed during the life cycle of an organism? What function does each of the molecules have in the life cycle of the organism? What factors regulate the amounts and types of molecules that are produced by cells?"

The study and identification of molecules requires a special knowledge of chemistry, physics and mathematics. The determination of the biological role of these molecules requires a knowledge of biology. Thus, two separate streams of knowledge come together in the science of biochemistry. As a consequence it is commonplace for the biochemist to work cooperatively with biologists from various disciplines and with chemists or physicists as the intricate and intimate secrets of cells and organisms are explored.

Knowledge of the chemical nature of the molecules and of the biochemical processes in the cell have found application in medicine and in agriculture. In medicine, treatment of diseases is often based on the use of synthetic molecules that are slightly different from the normal cell components. These synthetic molecules are used to alter the metabolism of invading cancer cells or bacteria to achieve disease control. In many instances the molecular basis of congenital diseases has been determined. Some two hundred of these diseases have been identified in which a single enzyme is absent. In quite a large proportion of these diseases, alteration of the diet permits the patient to lead a nearly normal life. It is likely that many of these diseases also occur in animals. Once the specific biochemical nature of a disease is known, the chances for the development of a treatment are greatly increased.

In agriculture, knowledge of the biochemical composition of a crop and the identification of the useful characteristics of the crop makes it possible to provide the animal or plant geneticist with useful criteria for measuring "quality." With these "quality" measurements, the genetic makeup of crops or animals can be manipulated to improve the economic value of the commodity. The development of high protein wheat, high oil sunflower or high lysine corn requires first a rapid and accurate measure of protein, oil or lysine content.

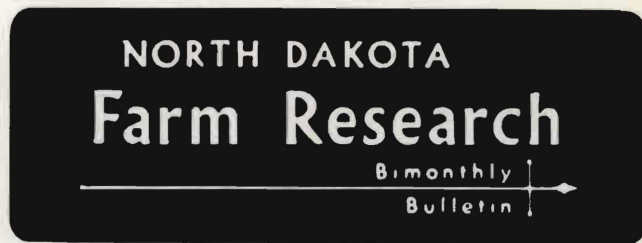
The contributions of the Biochemistry Department lie in the areas of both teaching and research. Each year 30 to 50 Graduate Research Assistants from most of the disciplines

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On the cover: Hazen is a new apple variety released by USDA and the Department of Horticulture.
Photo by Neal Holland.



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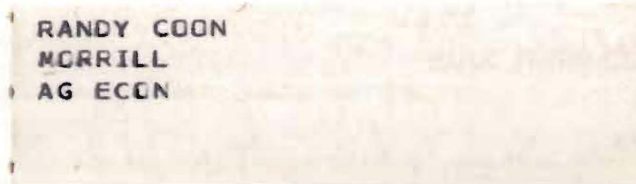
Correction: The issue number was printed incorrectly on the January-February issue of North Dakota Farm Research. The correct number is Vol. 37, No. 4.

H. H. Lund

DIRECTOR

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supported by the Agricultural Experiment Station enroll in graduate level biochemistry courses. The information and skills learned in these courses are used in the research conducted in their respective departments. For many years the Biochemistry Department has conducted an active research program on the biochemistry of oilseeds, especially flax and, more recently, sunflowers. This effort has been a cooperative one with the USDA which has supported one or two scientists located within the department. Another major effort is concerned with animal biochemistry with two studies underway—one concerned with the control of the metabolism of carbohydrates and another with the biosynthesis of thyroid hormone.

The emphasis on the safe use of chemical pesticides brought about the development of a special program for the study of pesticide residues. This program has two objectives: (a) determination of chemical residues in crops following the use of pesticides; (b) determination of changes the pesticide undergoes when applied to crops or soils. The information from these studies is being used by the Environmental Protection Agency in granting label clearance for the safe use of pesticides.

At the present time the department is actively involved in a program to develop alternative fuels for agriculture. The energy "crunch" has made the use of agriculturally derived liquid fuels more attractive. Our work is part of an interdisciplinary effort to identify those alternative fuels which have the greatest promise of success for this geographical region.

The material contributions of biochemistry to the general welfare have been notable and will probably continue and be greater. The identification of the vitamins, amino acids and other essential nutrients have made major impacts on our well-being. However, the real contributions of biochemistry will lie in providing an understanding of the chemistry of life. This is what biochemistry is all about.

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