

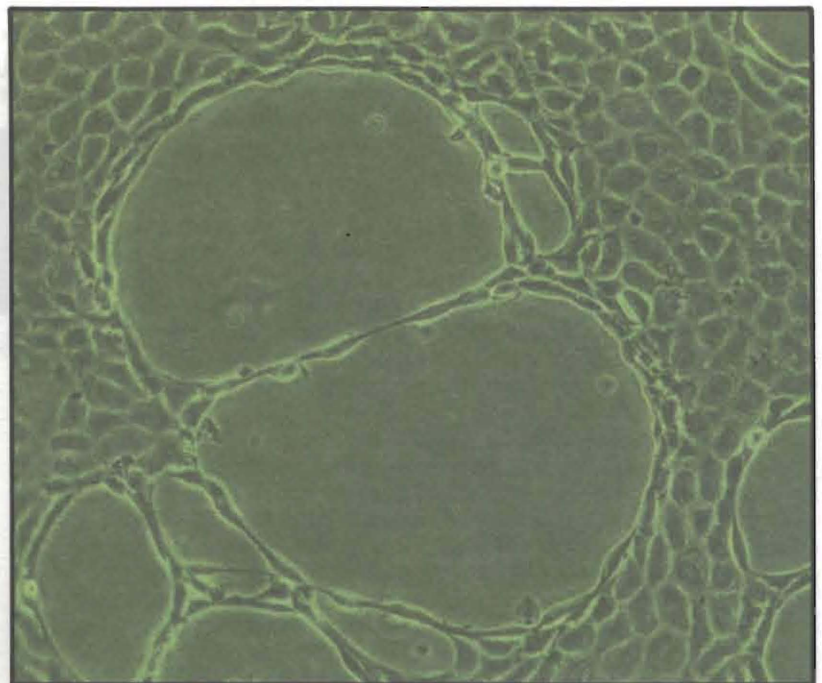
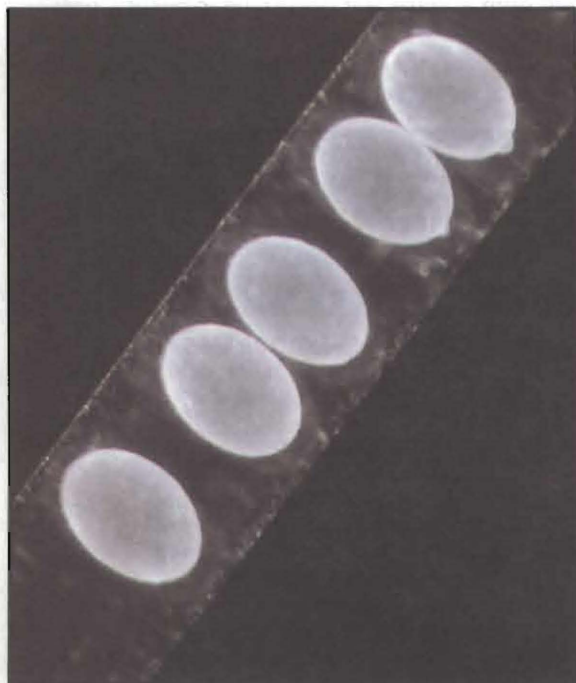


NORTH DAKOTA Farm Research

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Guest Column

T. Ross Wilkinson
Associate Dean
College of Agriculture



The College of Agriculture at North Dakota State University has distinguished itself among other colleges of agriculture around the country as being one of the first, if not the first college to establish a formal undergraduate major (an academic plan of study) in biotechnology. This major, which is offered both in the College of Agriculture and the College of Science and Mathematics was approved by NDSU and the North Dakota State Board of Higher Education in 1985. The only other similar program offering a B.S. degree was being initiated at Rutgers University in New Jersey during this same time period.

In 1987 as chairman of the subcommittee on Education and Manpower for the Division of Agriculture Committee on Biotechnology, National Association of State Universities and Land-Grant Colleges (NASULGC), I initiated a survey to ascertain a composite picture of academic programs focusing on biotechnology around the country. Only ten colleges of agriculture offered an undergraduate and/or graduate program in biotechnology (cellular and molecular biology). Four colleges offered an undergraduate (B.S.) degree, four colleges offered the Master's degree, two awarded the Ph.D. and 16 colleges were seriously considering the establishment of formal programs within the next two years. Thirty-two institutions did not offer any formal degree programs at the undergraduate or graduate level in 1987 and did not project the development of such programs.

However, during this period, there was a high demand for scientists by the "biotech" industry. As a result, many graduate level programs in molecular biology have subsequently been established in order to meet the demands of the industry, including NDSU. However formal programs at the undergraduate level remained minimal.

The payoff for establishing early on an undergraduate degree granting program in biotechnology at NDSU is being realized. The "biotech" industry is expressing a real need for technicians with a B.S. or M.S. degree. Even though there appears to be a continual demand for the doctoral-level scientist, the marketplace is apparently being satisfied by scientists changing employment among the "biotech" firms.

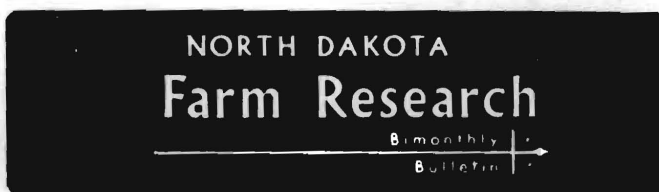
At North Dakota State University, the major in Biotechnology is an interdisciplinary academic program which offers a combination of theory and practical application. Each student must work in a research or industrial laboratory to gain the practical knowledge needed in this career area. In addition to the basic courses in biology, biochemistry, chemistry, mathematics and microbiology, the curriculum offers technical training in such areas as plant cell and tissue culture, plant micropropagation, animal cell culture, recombinant DNA, etc. Students in the College of Agriculture are encouraged to take additional courses in the animal and plant

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On the Cover: Research in biotechnology works with individual cells. Pictured are, clockwise from upper left, an isolated protoplast of potato, shoots arising from a callus originating from a single leaf cell grown in culture, vascular endothelial cells in culture, and five pig embryos eight days after fertilization in a micropipette. This issue is devoted to biotechnological research at NDSU.



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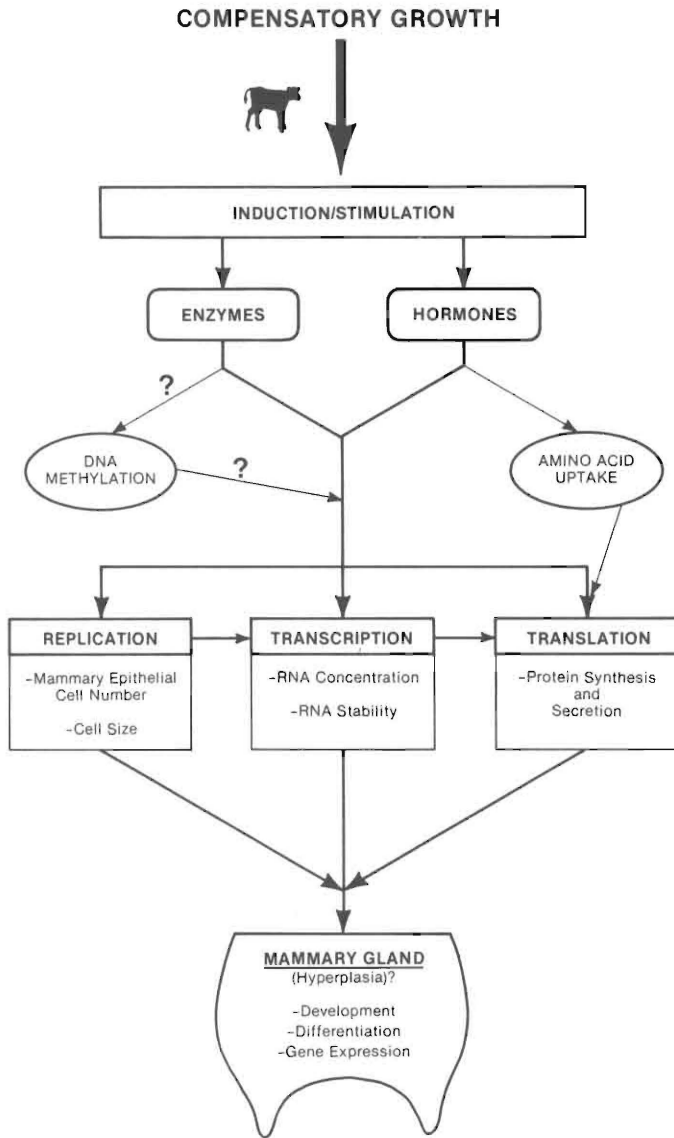


Figure 1. A model postulating the regulatory role of compensatory growth in mammary differentiation.

evaluation of the long-term, overall influences of compensatory growth and nutrient interactions on efficiency and longevity of lactation, reproductive performance, pregnancy, and survivability of progeny.

The data on cellular and molecular functions of the mammary gland obtained from this research will contribute to research directed at improving the quality of milk for nutritional and industrial purposes. Basic data on gene modulation is essential for the future development of an effective model for gene transfer experiments (e.g. transgenic cow) which may allow for the future reduction of lactose content in milk and the production of interferons or other blood factors in place of the usual casein or whey in milk.

Veterinary Science

Comments provided by **Dr. M. Herbert Smith**, Professor and Chairman

The biotechnology related research in the Department of Veterinary Science includes several projects. The bovine viral diarrhoea virus research is discussed in a separate article by Dr. Berry. Biotechnological approaches and techniques are being used to study the pathogenesis of BVDV induced disease. Research on the anti-idiotypic antibody vaccine against bovine brucellosis is in initial stages of development by Dr. Nemat Khansari. The anti-idiotypic vaccine would be entirely safe to use since it does not involve living organisms as do present vaccines. The response to the vaccine in cattle could also be identified as unique and different from field strain response. This would overcome a major problem in identifying vaccinates from animals naturally infected.

Khansari is also involved in the study of the reversal of immunological functions due to aging recombinant somatotrophic hormone, the development of a herpes virus specific cytotoxic T-cell using monoclonal antibody techniques, and the development of immunomodulating substances for use in cattle. Immunomodulatory substances incorporated in vaccines would produce a much more efficacious product and be of direct and significant benefit to the livestock producers.

Continued from page 2

sciences in order to expand their knowledge base and to enhance their career opportunities. At the present time, there are approximately 50 students who have declared a major in biotechnology.

The uniqueness of this program of study is its sound interdisciplinary course requirements, its practical application through on-the-job experience and its potential of new ca-

reer opportunities for our undergraduates. Even though the academic program is very demanding, the payoff is excellent in terms of professional career development and employment opportunities. North Dakotans will benefit from this program as an investment, not only in their children's education, but possibly in their state's economic development.

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