



Information Network and Education

A Cornerstone of the Institute of Forest Biotechnology

INFORMATION NETWORK COMPONENT

Genomics is a highly integrative discipline, bringing together biotechnology, automation and information technology to learn the structure, function and evolution of genes. Bioinformatics is the development and application of computational tools to biology. These computational tools analyze and utilize the unprecedented amounts of biological information contained in genome sequences and in the functional categorization of genes. Their development has been essential to the origin and future of genomics. The human genome project has provided a model for other species of long-term scientific and commercial interest, so that the sequencing of many plant and animal genomes are now in progress.

The power of genomics lies in its ability to integrate and utilize large datasets containing genetic, biochemical, cellular and morphological information. This ability will allow an increasing depth of understanding of the complex processes of growth, development, adaptation and evolution. The ultimate goal would be to increase our ability to accurately predict phenotype from genotype. The realization of this goal will depend on the nature of genetic and molecular interactions, which will be discovered in significant part through genomic methods and the appropriate computational tools.

To provide the computing, data storage and networking capabilities to support the genomics revolution, members of the NC Genomics and Bioinformatics Consortium are working with computer and networking companies to create the NC Bioinformatics Grid. The NC BioGrid will access genomic, proteomic and related data being collected throughout the world, combine it with non-proprietary data from Consortium members and make this collection

available to researchers and educators. As part of this effort, the Institute of Forest Biotechnology is developing a forestry genomics module to be placed on the grid to test various applications and remote access to the grid.

There are many advantages to the use of forest tree genomic data for this test. The data sets are small, manageable and representative of larger genomic datasets. Most importantly, the data are accessible, and the information is in the public sector. Long-standing industry, government and academic partnerships are already in place, providing an interactive community with interest in both the fundamental knowledge to be acquired and its practical application. The information derived from forest trees strengthens our knowledge of plant genomics and is applicable to agriculture and ecological sustainability.

A full forestry suite would include phenotypic data on selected trees (similar to medical patient data), genomic sequences, chromosomal

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maps, expressed gene data from ESTs, microarray data for RNA and proteins, cellular and subcellular locations of RNA and proteins, chemical profiling, genetic marker data including SNPs and genetic maps with quantitative trait analysis and analysis of wood properties.

Eventually, the BioGrid would contain forest genomics data that would be utilized by researchers across the nation and around the world. This important tool could have a significant impact on the wood products industry that has, on a global scale, an annual product value of \$400 billion and employs 3 million people.

EDUCATION COMPONENT

As people become aware of the burgeoning area of research and discovery that is forest biotechnology, many will want to learn more about its history, evolution, and potential. Communicating the science fundamentals of forest biotechnology, its

benefits to society, the environment and the economy as well as any attendant risks is an important goal of the Institute. This information must be integrated, synthesized and disseminated to broad audiences via publications, booklets, communicational flyers, meeting proceedings, project reports, and web based media.

The Institute will develop general educational pieces as well as collaborate on specific topics of interest. Educational materials will include information on the Institute and its four cornerstones.

Information Networking and Education will be integrated with the other cornerstones of the Institute of Forest Biotechnology to provide a path forward for the safe, appropriate and productive development of forest biotechnology. These cornerstones concern heritage trees, ecological risk assessment and management and charting cultural, ethical and societal perspectives.

Institute of Forest Biotechnology

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