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GUEST EDITORIAL

Structural Genomics

In the last few years, genome sequencing projects have produced an incredible wealth of information on the organization of living organisms and, in particular, of the human organism, enabling us to identify tendencies to illness and, in some cases, to manipulate the genome itself.

Proteins whose primary sequences are encoded in the genomes mediate most of the chemical reactions occurring in a living organism. Their three-dimensional structures can provide hints to an understanding of their functions and, ultimately, to an understanding of the chemical bases of life itself. Therefore, research leading to a complete coverage of protein structures logically follows the determination of genome sequences. Structural genomics is the field of science focused on the systematic determination of the three-dimensional structure of the proteins encoded into genomes.

Just as the determination of genome sequences has presented a major scientific challenge, so the determination of thousands of protein structures presents, in terms of quantity of data to analyze, an even greater scientific challenge. Proteins must be expressed, their identity checked, and they must be crystallised and investigated by X-ray, or enriched in stable isotopes (^{15}N , ^{13}C) and studied in solution by NMR. To respond to this demand,

high-throughput approaches must be devised, refined, and applied. This has resulted in the development of robotics for a number of applications, such as PCR setup, protein purification, crystallization, etc. In addition, structure determination methods must be made more efficient, and the results, both positive and negative, should be made public promptly.

Since 1999, consortia have been established under the patronage of the NIH (and initially of the DOE as well) among North American research labs with different specializations. In Europe there is a consortium called SPINE, which, in my view, is working well beyond expectations. In Japan the bulk of this activity is focused around the NMR labs in Riken and the Spring-8 synchrotron.

Structural genomics is spreading the philosophy of high throughput in all fields of science and making available new tools to speed up research procedures. This volume of *Accounts of Chemical Research* seeks to provide a glimpse of what is going on in this exciting field.

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Guest Editor

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