

Molecular Frontiers

By highlighting the central importance of molecules in life and technology, Molecular Frontiers seeks to increase the interest of young people in science and to identify the potential roles of chemistry and other molecular sciences in addressing global challenges.

“Molecules are everything.” This principle opens the website and is the central idea behind Molecular Frontiers (<http://www.molecularfrontiers.org>), a virtual organization dedicated to promoting chemistry and molecular sciences. Bengt Nordén, a professor of physical chemistry at Chalmers University of Technology in Sweden and the former chair of the Nobel Committee for Chemistry, is the inspiration behind Molecular Frontiers. Nordén is concerned with the “increasingly bad image that chemistry has in society” and the “decreasing interest in science by the young generation.” He has enlisted some of the world’s leading scientists to help reverse these trends, and Molecular Frontiers is the result.

Questions about the future of chemistry have also caught the attention of Richard Zare, a professor of chemistry at Stanford University, former chair of the US National Science Board and now president of the Executive Board of Molecular Frontiers. “Chemistry is so much of what our life is based on, from medicine to things like cell phones and computers,” observes Zare. “It’s not that chemistry alone makes them possible, but chemistry and molecular sciences are often at the center of technology today.” However, Zare has noticed that “education in chemistry fails to attract students at many universities, and people are increasingly turned off by chemistry.” This is paradoxical and particularly troubling, according to Zare, “because sciences such as medicine, biology and materials science increasingly rely on chemistry and chemical knowledge.” By placing an emphasis on the importance of a molecular understanding of the world, Zare envisions Molecular Frontiers having a role in “exciting young people about possible careers in chemistry and related molecular sciences.”

Molecular Frontiers will have two primary projects: a scientific think tank called the “Catalytic Forum” and an Internet-based virtual venue called “MoleClues” that aims to engage young people in the molecular sciences. Both of these activities will involve a 25-person scientific advisory board that is chaired by Ahmed Zewail and comprised of renowned researchers, including seven Nobel laureates. The scientists involved come from diverse fields of chemistry and from molecular areas of physics, mathematics and biology, and they represent fourteen different countries and four different continents. As Nordén describes, “Within two or three days, I called most of these people, and not a single one said that he or she was not interested.” This great response certainly reflects the importance this issue has in the scientific community.

The Catalytic Forum will be an annual gathering of the scientific advisory board to discuss the forefront of scientific topics, which, as Nordén notes, “have the molecule as the common language.” Nordén explains that in the Catalytic Forum, scientists “will survey a field and discuss what they expect to come up at the horizon.” In particular the discussions will touch on the potential implications of recent scientific advances and the possibility to use molecular sciences to address problems of global urgency. Because of the broad background of the participants, Nordén envisions these discussions “leading to many interdisciplinary ideas.” To make these ideas available to everyone, the discussions from these meetings will be released through video and print on the Molecular Frontiers website. The first Catalytic Forum, which will take place in Stockholm on February 2, will focus on frontiers of protein science. This was chosen for the first

topic, according to Nordén, because “life is of fundamental interest to all people and proteins are critical workers of the cell.”

The following day, the scientists will turn their focus to the second main objective of Molecular Frontiers—developing new approaches for engaging young people, particularly teenagers, in the molecular sciences. The web-based project MoleClues, which will be launched on the Molecular Frontiers website at the beginning of February, is a forum for young people to ask scientific questions on any molecular topic. “So much of our efforts in school are based on finding smart answers to questions, and yet the more important matter may be to ask the right questions,” according to Zare. In contrast, Molecular Frontiers, as Nordén notes, “will prize the question *per se*, emphasizing the ability to articulate a problem that is important.” Nordén believes that focusing on questions will stimulate curiosity even if, or perhaps particularly if, there is not an easy

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answer. As he notes, “this is the characteristic of a really good question: it urges you to think.” This focus on questions is especially appropriate for engaging young people in the scientific method because an interesting question is the requisite first step.

Through MoleClues, young people with molecular questions will be connected with graduate students within the Molecular Frontiers Resource Network. Questions and answers will be posted, as will additional content created by young people and Molecular Frontiers, thus creating a dynamic and interactive website. At the end of each year, the 20 girls and 20 boys who submitted the best questions will be given prizes. As Zare notes, “We want to encourage participation of young men and young women in about equal amounts.” He feels this is important because “we have a whole untapped group of women, whom I want to see involved in science.” In addition to prizes, the winners will receive an invitation to attend the Catalytic Forum, which will offer these young people the unique opportunity to interact with prominent scientists and their global peers.

Zare remembers that as a young person he “got enchanted with what makes the world work the way it does.” He hopes that Molecular Frontiers will provide a forum that will help to spark this curiosity in a new generation. Although Nordén and Zare are aware that the organization’s goals are challenging, they are cautiously optimistic. “We are really trying to get this to take off and become an international movement,” notes Zare. “My hope is that this will be a real catalytic force for getting young people to become interested in science.” How to engage teenagers in science may be the most difficult question for Molecular Frontiers; hopefully the combined efforts of these distinguished scientists will be able to provide answers.

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