The Institute of Biological Engineering

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Message from the President

by IBE President, Lalit Verma

In mid-July Roy Young and Jerry Gilbert accompanied me in meetings with the leadership of Society for Biomaterials (SFB), IEEE-EMBS, AIChE, and ASME. The agenda for this meeting was to seek collaboration and support for advancing Biological Engineering; to solicit participation at the 2005 IBE meeting; to explore arrangements and/or memorandum of understanding regarding co-sponsoring meetings, joint memberships, etc; and to collaborate on funding for special conferences to define and develop core competencies and skills at the baccalaurate level for the discipline of Biological Engineering. We were pleasantly surprised at the high level of interest expressed by all these four societies in collaborating with IBE.

We wish to continue this approach with other societies such as ASCE, Ecological Engineering, ASAE, ASEE, IFT, American Society of Biomechanics, and surfaces in Biomaterials. Please let Jerry Gilbert or me know if you have some personal contacts with the leadership of any of these societies and would be willing to help.

Brahm Verma is providing leadership in inviting representatives from various societies to participate in our 10th meeting in March, 2005 in Athens, Georgia. Brahm is also leading the charge to have a significant Development Fund for key projects of interest to IBE. Judy Bourdeau, IBE Executive Director, will be working on arrangements and/or memoranda of understanding regarding co-sponsoring meetings, joint memberships, etc. Roy Young is taking the lead on partnering with peer societies to explore funding for special conferences to define and develop core competencies and skills at the baccalaurate level for the discipline of Biological Engineering. Jerry Gilbert is leading the effort to increase IBE membership, which is crucial for us, and there is great potential for growth.

As you can see there are several initiatives underway, and we solicit your help and input. Please feel free to share your suggestions. Thanks for your continued interest in IBE.

Editor, Art Johnson Missionaries on a Quest

Movements don't go anywhere without zealots. While Biological Engineering is not what some would call a religion, it has many of the elements nonetheless: there is an underlying need, its principles are emerging, and those dedicated to its cause can exhibit a strong passion for its spread.

Passion and emotional involvement beget excitement, and excitement is what Biological Engineering is all about. You hear the excitement in the voices of those discussing the field, and you see it in their actions. It is the same excitement that comes from discovering a new connection in your research findings, or from experiencing a new piece of music for the first time, or from learning some new skill.

I have seen this same excitement in the field of biomedical engineering when it was first being formed. During those years, if you wanted to provoke raised voices and passionate debate, you just had to bring up the issue of what the field should be called or what specialties should be

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included. Many a late night was spent and many a malt was consumed debating the nuances of biomedical engineering.

Those days for biomedical engineering have passed. The field is mature now, and in gaining maturity, a lot of the passion of the new field attenuated.

There is no reason to expect any different from Biological Engineering. The time for passion is now. The time to debate its qualities and inclusions is the present. Soon enough, should we succeed, Biological Engineering will enter into its mature phase and people will think little of what it has become or how it got there. And few will appreciate the passion of its founders.

You will read elsewhere in this newsletter about the efforts by several passionate people to reach out to the rest of the engineering community to bring more into the fold. This effort is to be applauded. If it succeeds then Biological Engineering can achieve permanence.

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Global Networking Opportunities!

Judith M. Bourdeau, CAE
IBE Executive Director

The Institute of Biological Engineering (IBE) offers the worldwide community a resource of biological engineering experts through its Peer to Peer Network™. The network gives visitors to the IBE website an opportunity to search for individuals in a selected category and connects the visitor to IBE members by providing email contact information.

Peer to Peer is a valuable resource for members to get the word out about their work and allows year-round global networking for those interested in the field. Members of IBE can participate in the network for free by visiting **http://www.ibeweb.org/peertopeer/** and updating their information.

The Network helps to strengthen IBE's position as the primary resource for biological engineering information and networking opportunities.

Biological Engineer at Work

Annette Dixon interviewed Brian King, who graduated from the Biological Resources Engineering program at the University of Maryland in 2001. Brian has been working in the biotechnology industry.

Question: How did you choose your major?
I chose Biological Resources Engineering because it addressed the application of basic engineering principles and techniques to biological systems. I initially began as a chemical engineer but quickly realized that it did not expose me to the subject matter (nor the organizations) I was hoping to work with. However, nowadays I am finding that chemical engineering is transforming to include more attention to biological applications.

Question: How did you get your job?
Two things are primarily responsible for my initial success — a connection and tenacity. My first job was with Wyeth in Andover, MA. A classmate of mine at UMCP did an internship there and he connected me with his supervisor. After I started the networking process, it was persistence and enthusiasm that landed me the job when I was offering no previous biotechnology experience.

Question: What does you job entail? Do you feel there is a firm understanding of biological engineering and applications at your job?
I work in the purification branch of biotechnology. My goal is to design robust and economic processes to purify a target protein, contained within a cell culture feed stream, using the protein's intrinsic properties. Two unit

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operations commonly used in purification processes are liquid chromatography over a packed bed and membrane filtration.

I believe a firm understanding of biological engineering is not required to successfully perform my job function. Several of my colleagues have a degree in a biological science and are capable of completing similar tasks that I face. However, I feel the advantage of having an engineering degree can bring a different perspective forward when problems arise. A firm understanding of our discipline can give you the insight and ability to not only explain certain behaviors, but also model them using principles such as thermodynamics, fluid mechanics, and transport phenomena.

Question: Does a B.S. limit your career and would an advanced degree help?
In general, an advanced degree would help; however, it can depend on the company you are with and what level you wish to initially obtain. If you are looking for an entry-level position, a B.S. degree should suffice; however, if you can earn a M.S. degree, more options and opportunities can open up: higher positions such as a manager or an advanced junior-level (i.e. non-PhD) employee.

Question: Are you pursuing a PE certification?
I am not currently pursing a PE certification. At this time, I am pursuing a professional master's degree in chemical engineering.

Question: How much of what you have learned in school is applicable to your job? Is the work you did in college similar to the work you're doing now?
I can't say that I crunch equations and model reactors or flow dynamics every day but occasionally in order to understand how a system works so we can improve it, engineering can help. I would say 80% of what I learned helps me occasionally.

College work provided an opportunity to sharpen a more intangible skill — how to reason, question, and learn. The work I do now could be referred to as "feedback application engineering" — putting our knowledge to work while constantly improving our experience base.

Question: Do you feel the field of biological engineering is up to date in its major requirements? Is there any course or skill you wished you had learned before entering the field?
After graduating from the University of Maryland with my undergraduate degree, I wanted to pursue the field of biomedical engineering; however, I quickly realized that I did not have enough depth in electronics. In addition, courses dealing with transport phenomena were not as extensive as I have seen with other engineering disciplines. The undergraduate level focuses primarily on ideal systems, where many variables can be considered negligible. However, in the real world, non-idealities are known to dominate. This fact supports my recent decision to pursue an advanced degree after only 2 years in the workplace. In my first semester as a graduate student, I have seen the benefit of advanced study since the majority of my classes tackle how to define and model non-ideal systems.

Question: What fields in biological engineering do you see emerging?
Nanotechnology, alternative fuels, biomaterials (e.g. prosthetics, implants), and even biotechnology are a few examples, in my opinion, of emerging areas that may be of interest to biological engineers.

Question: Do you have any advice for the up and coming biological engineers?
The best piece of advice that I can give to the maturing biological engineer is to explore the possibilities of this major. Do whatever it takes to experience and obtain information related to what biological engineering can deliver: witness an NIH poster day, contact the Department of Agriculture, attend a career fair, talk to your faculty, become a student member of an academic society, subscribe to a related journal. It's very important to know what you can do when you are ready to pursue your professional career with this major, or any major for that fact. Make sure that you are striving for a goal beyond the degree or a job. In other words, try to ensure that your major of choice will provide you with more than a salary, but with meaning and satisfaction.

Another piece of advice is to be professional and to keep in touch with your roots. For example, the biotechnology field is considered small in the United States. When you keep in touch with your past, it can be a helpful source of

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guidance and assistance as you plan your future. Don't ever forget where you came from and who helped you along the way.

Question: What types of pre-graduation experiences make a recent grad a more enticing hire?

In a simple statement — experience related to your current field. Moreover, show how it fostered attributes including leadership, prioritization, multitasking, initiative, and above all responsibility. Related experience can show a company you are focused, motivated, and even enthusiastic. Engineers are commonly associated with having problem solving skills. This is true but you cannot rely on this alone. You will need other qualities to complement and enhance your ability to conduct yourself as a respectable professional.

Real-Time Membership Information

by Judith M. Bourdeau, CAE
IBE Executive Director

Need to reach another IBE member? Have you recently changed your email address? IBE's online membership directory provides the tools you need to reach other members and help them stay in contact with you. The online directory allows IBE members to search for other members and supplies email contact information. Members can update their contact information any time by visiting **http://www.ibeweb.org/member/** and clicking on the update profile link.

Mississippi State IBE Chapter Report

The Mississippi State University IBE student chapter's semester started off with a trip to the Institute of Biological Engineering National Conference held in Fayetteville, Arkansas. Nine students and two professors make the trip up to the University of Arkansas to attend the event. While there the MSU delegation attended seminars in the areas of nanotechnology, biochemistry, biomechanics, biomaterials, biological transport phenomena, and many other fields of specialty. Former department head Dr. Jerry Gilbert and MSU IBE President David Macias were elected to the IBE National Council as president-elect and undergraduate councilor, respectively. They took office at the meeting. "I'm glad to be able to represent Mississippi State on the national level," said David.

As Valentine's Day approached, IBE found ways to make new friends on campus. IBE collaborated with the American Institute of Chemical Engineering to host a joint date auction fundraiser. Several local area businesses (Mexico Tipico, Mi Hacienda, The Grill, Stromboli's, and Garfield's and CJ's of Columbus) donated gift certificates to make the dates a little more fun. Because of the many IBE members who agreed to be auctioned off, IBE was able to raise over 300 dollars.

National Engineers Week was this February 23rd through 27th. To celebrate this event, Engineering Student Council (ESC) hosted E-Week competitions, pitting engineering majors against one another in a battle for best major in the college. Many IBE students turned out for the events of the E-week competition, especially E-lympics where IBE placed 2nd overall. Dean Wayne Bennett commended ESC and all the engineering majors for their efforts.

Continuing to interact with other organizations, IBE took a trip with landscape architecture students to the Mississippi Gulf Coast on March 29th and 30th. While there, students toured a wetlands water treatment facility, learned about ecological factors affecting our costal waterways, and planted sea hay on the beach. The two-day excursion was not without recreational activity, however. Students were able to enjoy a schooner ride on the way to and from Horn Island, where the students spent a day lounging on the beach.

IBE held its last meeting of the semester on Tuesday, April 27th. At that meeting new officers were elected and a new faculty advisor were selected. The IBE board for 2004-2005 consists of: President Shawn Sanders, Vice-President Chaz Seyfarth, Secretary Katherine Sinele, Treasurer Katherine Cleveland, and Special Events Coordinator Alex Allen. Dr. Filip To accepted the position as faculty advisor.

Cornell University IBE Chapter Report

Over the past year, Cornell University's Chapter of the Institute of Biological Engineering has succeeded in reaching out across Cornell's campus to encourage interest in biological engineering as well as strengthening the student component of the organization. This year marks our second anniversary as an established chapter. Since our establishment, our board has grown from two officers to a seven-member board of biological engineering students and membership in our chapter has grown to over 50 members. In addition, two biological engineering faculty members serve as advisors.

During the Fall of 2003, the chapter focused on increasing student involvement in the organization. The semester began with a "Welcome Back" pizza party where students and faculty members of Cornell's department of Biological and Environmental Engineering were able to chat in an informal setting. In August, the Chapter helped man Cornell's Nanobiotechnology Booth at The Great New York State Fair. In November, approximately 10 members participated in a service event at Ithaca's hands-on Science Center. Not only did the members get a chance to interact with the children of the Ithacan community at this event, but they were also reminded of their own curiosity as a child in the world of science. Last but not least, the Fall semester marked the creation of our Chapter's web page, now located at: **http://www.rso.cornell.edu/ibe/**

In the spring of 2004, students also took the initiative to help communities beyond Cornell, and we carried out a book/toy drive for a school in Jamaica for Special Education. Students from our chapter traveled to Jamaica and delivered the donations. In April 2004 our chapter hosted the Annual BioEngineering Research Expo. In attendance were over 100 students, faculty and staff members from various departments on campus. The first day consisted of a poster session where undergraduate students in biological engineering at Cornell were able to present their work to the poster competition judges as well as fellow students; there were 4 winners this year. Among the sponsors were the Department of Biological & Environmental Engineering (BEE), the College of Engineering, the Vice President of Undergraduate Provost, Student Activity Fee Commission, NYSEG, the Bartel's family fund, Genencor International, the Cornell Store, and the Department of Electrical and Computer Engineering. The second day featured speakers Dr. Henry Masur from the NIH, Dr. Carlo Montemagno from the Department of Mechanical and Aerospace Engineering at UCLA, and Mr. Brian Appel, CEO of Changing World Technologies. Through this event, IBE provided a venue for students to present their work and for professionals in the field to learn about the cutting-edge research conducted on campus.

In addition to the BioEXPO, we co-sponsored a blood drive and participated in the Centennial Celebration Parade for Cornell's College of Agricultural and Life Sciences. Our participation in this parade surpassed all expectations as a group of dedicated IBE members; faculty and friends took on the task of building a giant model of the mascot for the Department of Biological and Environmental Engineering, a Bee. Thanks to the unconditional support of the BEE department and IBE members, the float was awarded 1st place at the float competition.

This year we also took a step forward to build partnerships with Companies and we did so by hosting our first Company Information Session presented by Mr. Keith Miller from Pfizer. On October 1st, IBE will be hosting its first Round Table discussion with representatives from companies as well as faculty and students in order to discuss trends in biological engineering and how IBE and Cornell Career Services can facilitate the communication between students and companies. Invitations are currently being mailed out, for more information, please visit our website. The transition between the 2003-2004 and the 2004-2005 Executive Board has taken place and we hope that this year's activity further increase awareness of the Biological Engineering field.

The making of a mascot...

adding the mesh

adding the paper layer

final product all a buzz in the parade!

IBE 2004 Officers

President: Lalit Verma, Univ. of Arkansas
President-Elect: Jerry Gilbert, Mississippi State Univ.
Past-President: Roy Young, Penn State Univ.
Secretary: David Jones, Univ. of Nebraska
Treasurer: Tom Richard, Iowa State Univ.

Councilors-at-Large: Terms expiring January 2006
-Vince Bralts, Purdue Univ.
-Czarena Crofchek, Univ. of Kentucky
-Charles Kinoshita, Univ. of Hawaii
-Steve Walker, Penn State Univ.

Councilors-at-Large: Terms expiring January 2005
-Antje Baeumner, Cornell Univ.
-Steve Hall, Louisiana State Univ.
-Tim Fisher, Purdue Univ.
-Mark Riley, Univ. of Arizona
-Tim Taylor, Utah State Univ.

Graduate Councilor: Barbara Crompton, Univ. of Georgia

Undergraduate Councilor: David Macias, Mississippi State Univ.