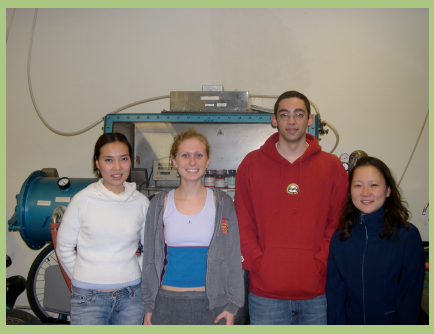
Undergraduate Chem. Rsch.



The University of California at Santa Barbara fosters an introduction to research through organic chemistry.

Learning through success and failure

Thanks to private donors and industrial companies, a select group of undergraduates find themselves in the heart of the University's intellectual community, where they discover the thrilling (and often messy) process of creating new knowledge.

The Mechanics

Faculty announce in the fall that outstanding sophomores will be chosen to work in research labs ***in lieu*** of the laboratory sequence. Participants are selected on the basis of career aspirations, and research potential. Each participant is assigned a graduate student mentor and a faculty advisor. During the next twelve weeks, the undergraduate researcher shadows their graduate mentor, running the same experiments, experiencing the same day, becoming absorbed into their project and group. After three months, the undergraduate turns-over their notebook and presents an oral and written overview of their project summarizing the new skills they mastered. The faculty advisors, graduate mentors and other undergraduate participants jointly evaluate every participant.

Analysis

Every year, all research active organic advisors are invited to host one to three undergraduates in their laboratories for the winter and spring quarters. Their best third, fourth and fifth year students are asked to propose a short 12-week project that would train an undergraduates participant in all aspects of organic chemistry. The graduate mentor then devote 20-40 hours a week overseeing their undergraduate participant introducing them to their research problem. For 2004, thirteen undergraduate students participated. In 2005, twenty-one students joined the program. The experience has forever changed the lives of these participants. Undergraduates are becoming "hooked" on science and are choosing future careers in chemistry and biochemistry. Graduate mentors are learning valuable "soft skills" and how to become better mentor in the workplace and faculty are finding new enthusiastic recruits that stimulate their entire program.

Sponsors

A team costs approximately three thousand dollars to support. The program requires a graduate student to commit a tremendous amont of time and energy and precludes their support through other mechanisms such as teaching and graduate research assistantships. The enthusiastic, but untrained, undergraduates consume chemicals and glassware. Donations from AMGEN, Pfizer, Roche and the College of Creative Studies have helped defray the costs. However, the program needs additional sponsors to continue.

3M Abbott Laboratories Clorox Bristol-Myers Squibb gsk GlaxoSmithKline Lilly MERCK NOVARTIS SANKYO Wyeth

Natalie L. Spritzer

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Research Group Affiliation: Bode Group
Graduate Student Mentor: Michael Drew

MARCH 1ST 2005

Objective

To earn a B.S. in Chemistry with emphasis on molecular synthesis and then enter graduate studies in Bio-organic or Medicinal Chemistry

Education

Chemistry major in college of creative studies
2003–2006 University of California, Santa Barbara

Related Coursework

Current GPA : 3.70 * = honors courses

Chemistry		Physics		Biology		Mathematics	
Gen. Chem. (1A)	B+	Phys. (6A)	C+	Bio* (1A)	A	Calc (3B)	C+
Gen. Chem. (1AL)	A	Phys. (6AL)	B+	Bio* (1AL)	A	Calc (3C)	A
Gen. Chem.* (1B)	A	Phys. (6B)	A-	Anatomy (47)	A	Lin.Alg. (5A)	B+
Gen. Chem.* (1BL)	A	Phys. (6BL)	A				
Gen. Chem.* (1C)	A						
Gen. Chem.* (1CL)	A–	**Currently Enrolled**					
Org. Chem. (109A)	A	Org. (109B), Phys. (1B), Writ. Sci & Tech. (109ST)					
Org. Chem. (6AL)	A–	Chem. 6B and Chem. 6C (Honors Pilot Program)					

Laboratory Techniques

Titration, chromatography (thin-layer & column, 10 mg - 10 g), set-ups including "freeze–thaw" and cooling, Rotovap use; [biological] gel electrophoresis, PCR. NMR, UV, IR spectroscopy; and gas chromatography.

Laboratory Experience

Oct 04-present Mentor: Dr. Jeffrey Bode, Dept. Chem. and Biochem, UCSB
- synthesis of a modified molecule used for coating AFM probes

Nov 03-April 04 Mentor: Dr. Deborah Fygenson,
- research on an Alzheimer's related protein (tau)

April 04-Aug 04. Applied Lifescience Research Industries™ in Ventura, CA)
- synthesized methylcreatine

Activities

Vice-Pres.UCSB Chemistry Club, Science Fair mentor; Annual Science and Technology volunteer, Member, National Cum Laude Society (inducted May, 2003). Member, Sigma Beta Honors Society (inducted January, 2004). Participant in UCSB College of Creative Studies. Over ten years of sports team involvement at national level competition in ice hockey and lacrosse.

References

Professor Jeffery Bode	bode@chem.ucsb.edu	(805) 893-3717
Dr. Yoko Yamakoshi	yamakoshi@chem.ucsb.edu	(805) 893-3638
Professor Petra Van Koppen	petra@chem.ucsb.edu	(805) 893-5512
Professor Bruce Lipshutz	lipshutz@chem.ucsb.edu	(805) 893-2521

Adam Powell

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Research Group Affiliation: Pettus Group
Graduate Student Mentor: Kris Gowin

MARCH 1ST 2005

Objective

To earn a degree in chemistry and continue studies in graduate school.

Education

2003 - Present — *University of California, Santa Barbara*
BS in Chemistry — *anticipated June of 2007*
BE Chemical Engineering — *anticipated June of 2007*

Related Coursework

Current GPA : 3.12 * = honors courses

Chemistry	Physics	Mathematics	Chem. Eng.
Chem 2A*	Phys 1	Math 3A	Chem Eng 10
Chem 2AC*	Phys 1L	Math 3B	
Chem 2B*	Phys 2	Math 3C	
Chem 2BC*	Phys 2L	Math 5A	
Chem 2C*	Phys 3	Math 5B	
Chem 2CL*	**Currently Enrolled**		
Chem 109A	Chem 109B, Phys 4, Phys 4L, Chem 124, Chem 6bc(L		
Chem 6A	Chem. En. 10A (Thermo)		

Laboratory Techniques

NMR, UV & IR spectroscopy, TLC, pH measurement, melting point determination, titration, distillation, crystallization, column chromatography, anhydrous techniques

Laboratory Experience

Dec 05 - present Mentor: Dr. T. R. Pettus
Department of Chemistry and Biochemistry, UCSB
• optimizing asymmetric method for synthesis of chiral six-membered rings

Awards received

Governor's Scholar, Eagle Scout

References

Dr. Thomas Pettus	805-893-5531	UCSB
Dr. Leroy Laverman	805-893-5265	UCSB

Briana R. Lee

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Research Group Affiliation: Little Group
Graduate Student Mentor: Jinnie Myung

MARCH 1ST 2005

Objective

To earn a degree in biochemistry and continue studies in graduate school.

Education

BS in Biochemistry — anticipated June / 2007
2003–07 — University of California, Santa Barbara

Related Coursework

Current GPA : 3.46

* = honors courses

Chemistry

Gen. Chem. (1A)	B+
Gen. Chem. (1AL)	A
Gen. Chem. (1B)	A-
Gen. Chem. (1BL)	A
Gen. Chem. (1C)	B
Gen. Chem. (1CL)	B+
Org. Chem. (109a)	A-
Org. Chem. (6AL)	A-

Physics

Phys. (6A)	B
Phys. (6AL)	B+
Phys. (6B)	B
Phys. (6BL)	A

Biology

MCDB (1A)	A
MCDB (1AL)	B+
Math (3C)	B

Mathematics

Math (3A)	B+
Math (3B)	B

Currently Enrolled

Chem. 109B, MCDB 1B/1B, Chem. 124, Chem. 7BLab

Laboratory Techniques

NMR, UV & IR spectroscopy, TLC, pH measurement, melting point determination, titration, distillation, crystallization, column chromatography, anhydrous techniques

Laboratory Experience

Jan 2005-present Mentor: Dr. D. Little
Department of Chemistry and Biochemistry, UCSB
- involved in total synthesis of (-)-Reiswign A

Sept 04-Dec 04 Mentor: Dr. L. Wilson
Department of Molecular, Cellular Developmental Biology, UCSB
- implanted animal genes inside plasmid cells
- examined chromosome movements using electrophoresis
- determination of protein concentration
- analysis of enzyme properties

carried out the polymerase chain reaction

References

Dr. Thomas Pettus	805-893-5531	UCSB
Dr. R. Daniel Little	805-893-3693	UCSB

Eric A. Davalos

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Research Group Affiliation: Bode Group
Graduate Student Mentor: Kenneth Chow

MARCH 1ST 2005

Objective

To earn a degree in biochemistry and continue studies in graduate school

Education

BS in Biochemistry — anticipated June / 2007
2003–07 — University of California, Santa Barbara

Related Coursework

Current GPA : 3.85 * = honors courses

Chemistry		Physics		Biology		Mathematics	
Gen. Chem. (1A)	A	Phys. (6A)	A	Bio* (1A)	A	Calc (3B)	B+
Gen. Chem. (1AL)	A	Phys. (6AL)	A	MCDB (1AL)	B	Calc (3C)	A
Gen. Chem.* (2B)	A	Phys. (6B)	A+			Lin. Alg. (5A)	A
Gen. Chem.* (2BL)	A	Phys. (6BL)	A				
Gen. Chem.* (2C)	A						
Gen. Chem.* (2CL)	A–	**Currently Enrolled**					
Org. Chem. (109A)	A	Org. Chem. 109B, Bio 1B, EEMB 2					
Org. Chem. (6AL)	A–	Chem. 6B and Chem. 6C (Honors Pilot Program)					

Laboratory Techniques

NMR, UV & IR spectroscopy, TLC & GC chromatography, pH measurement, melting point determination, titration, distillation, crystallization, column chromatography, anhydrous techniques

Laboratory Experience

Jan 05-present Mentor: Dr. Jeffrey Bode, Dept. Chem. and Biochem, UCSB
- researching new methodology for the synthesis of β-peptides
- involved in total synthesis of β-peptides

Jun 04-Sep 04 Mentor: Dr. Gary Loomis, Valor Medical
- operated HP 5890A Gas Chromatograph w Chemstation Software
- analyzed viscosity, refractive index, and sulfur dioxide concentration
- wrote standard operating procedure manuals

Activities

Member of Sigma Beta, Santa Barbara Honors Society, Alpha Lambda Delta, National Honors Society, National Society of Collegiate Scholars, National Honors Society

References

Jeffrey Bode	805-893-3717	UCSB
Gary Loomis	858-922-4574	G.L. Loomis & Associates

Michael T. Kwong

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Research Group Affiliation: Lipshutz Group
Graduate Student Mentor: Asher Lower

MARCH 1ST 2005

Objective

To earn a degree in biochemistry or molecular biology and continue studies in graduate school

Education

BS in Biochemistry — anticipated June / 2007
2002–07 — University of California, Santa Barbara

Related Coursework

Current GPA : 3.2 * = honors courses

Chemistry		Physics	Biology	Mathematics
Gen. Chem. (1A)	A	Phys. (6A)	Bio (1A)	Calc (3B)
Gen. Chem. (1AL)	A-	Phys. (6AL)	MCDB (1AL)	Calc (3C)
Gen. Chem. (1B)	A	Phys. (6B)		
Gen. Chem. (1BL)	A	Phys. (6BL)		
Gen. Chem. (1C)	A+			
Gen. Chem. (2CL)	A–	**Currently Enrolled**		
Org. Chem. (109A)	A–	spectroscopy (chem 124), organic chem 109b		
Org. Chem. (6AL)	A–	Chem. 6B and Chem. 6C (Honors Pilot Program)		

Laboratory Techniques

NMR, TLC & GC chromatography, melting point determination, titration, distillation, crystallization, column chromatography, anhydrous techniques

Laboratory Experience

Jan 2005-present — Mentor: Dr. B. Lipshutz
Department of Chemistry and Biochemistry, UCSB
Regioselective optimization of the carboalumination of an alkyne with differing zirconium catalysts

Activities

References

Bruce Lipshutz — UCSB

Joe Moss

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Research Group Affiliation: Bode Group
Graduate Student Mentor: Alex Lippert

MARCH 1ST 2005

Objective

To earn a degree in biochemistry or molecular biology and continue studies in graduate school

Education

BS in Biochemistry — anticipated June / 2007
2002–07 — University of California, Santa Barbara

Related Coursework

Current GPA : 2.75 * = honors courses

Chemistry		Physics		Biology		Mathematics
Gen. Chem. (1A)	A	Phys. (6A)	B	Bio (1A)	C	Calc (3A) C
Gen. Chem. (1AL)	B	Phys. (6AL)	A-	MCDB (1AL)	C	Calc (3B) A-
Gen. Chem. (1B)	B	Phys. (6B)	C	Bio (1B)	C+	Calc (3B) C
Gen. Chem. (1BL)	B	Phys. (6BL)	B+	Bio (1BL)	C	Calc (3B) C
Gen. Chem. (1C)	B	Phys. (6C)	A-			
Gen. Chem. (1CL)	C	Phys. (6CL)	B+			
Org. Chem. (109A)	A–	**Currently Enrolled**				
Org. Chem. (109B)	A	spectroscopy (chem 124), chem 184				
Bio. Chem. (142A)	B-	Chem. 6B and Chem. 6C (Honors Pilot Program)				

Laboratory Techniques

NMR, TLC & GC chromatography, melting point determination, titration, distillation, crystallization, column chromatography, anhydrous techniques

Laboratory Experience

Jan 2005-present — Mentor: Dr. J. Bode
Department of Chemistry and Biochemistry, UCSB
Synthesis of bullvalene

Activities

References

Dr. Jeffery Bode — UCSB

Adam C. Britto

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Research Group Affiliation: Little Group
Graduate Student Mentor: Gisele Nishiguchi

MARCH 1ST 2005

Objective

To earn a degree in biology and continue studies in graduate school

Education

BA in Biological Science anticipated June / 2007
2002–07 University of California, Santa Barbara

Related Coursework

Current GPA : 2.92 * = honors courses

Chemistry		Physics		Biology		Mathematics	
Gen. Chem. (1A)	B	Phys. (6A)	A	Bio (1A)	A	Calc (3A)	C
Gen. Chem. (1AL)	A-	Phys. (6AL)	B	MCDB (1AL)	A-	Calc (3B)	C
Gen. Chem. (1B)	C+						
Gen. Chem. (1BL)	B						
Gen. Chem. (1C)	B–						
Gen. Chem. (1CL)	A–	**Currently Enrolled**					
Org. Chem. (109A)	B+	Chem 109B, MCDB 1B, MCDB 1BL, EEMB 2					
Org. Chem. (6AL)	B	Chem. 6B					

Laboratory Techniques

NMR, TLC & GC chromatography, melting point determination, titration, distillation, crystallization, column chromatography, anhydrous techniques

Laboratory Experience

Jan 2005-present Mentor: Dr. R. D. Little
Department of Chemistry and Biochemistry, UCSB
• involved in total synthesis of the natural product diplopyrone

Activities

References

Professor R. Daniel Little UCSB

Elizabeth Bacon

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ebacon@umail.ucsb.edu

Research Group Affiliation: Pettus Group
Graduate Student Mentor:Maurice Marsinin

MARCH 1ST 2005

Objective

To earn a degree in chemistry and continue studies in graduate school

Education

BS in Chemistry	anticipated June / 2007
2004–07	University of California, Santa Barbara
2002–04	Marymount College, Palos Verdes

Related Coursework

Transfer GPA : 3.65

Chemistry		Physics		Biology		Mathematics
Org. Chem. (109A)	A	Phys. (6A)	A	Bio* (1A)	A	Calc (3B) B+
Org. Chem. (6AL)	A–	Phys. (6AL)	A	MCDB (1AL)	B	Calc (3C) A

Currently Enrolled

Org. Chem. 109B, Chem 124
Chem. 6B and Chem. 6C (Honors Pilot Program)

Laboratory Techniques

NMR & IR spectroscopy, TLC & GC, pH measurement, melting point determination, titration, distillation, crystallization, column chromatography, anhydrous techniques

Laboratory Experience

Jan 05-present Mentor: Dr. Thomas Pettus, Dept. Chem. and Biochem, UCSB

- involved in total synthesis of Mitorubrinic Acid
- learning basic laboratory skills

Activities

Only science!

References

Dr. Thomas Pettus	805-893-5531	UCSB

In Their Words

Natalie Spritzer

My project falls under the more general category of "Supra-molecular Chemistry for Biomedicine" and involves the synthesis of 1,3,5,7-tetrasubstituted adamantanes and p-substituted tetra-phenyl-methanes for atomic force microscopy (AFM) applications. My work focused primarily on the synthesis of a p-substituted tetra-phenyl-methane. The p-substituted tetra-phenyl-methane molecule will be attached to the tip of an Atomic Force Microscopic Instrument and measure the strength of a biomolecular (biotin-streptavidin) bond.

The Undergraduate Research Enrichment Program was one of the most pivotal experiences in my undergraduate studies thus far. I not only gained a thorough understanding of the research process, but I also gained an immense respect for researchers who dedicate their lives to advance their fields. I have truly been inspired and plan to continue in the footsteps of my graduate student mentors and research advisors

Adam Powell

Pogostol and Kessane are two important natural products of interest. Pogostol is a constituent of the patchouli plant, which is used as an anti-emetic by traditional Chinese medicine. Kessane is related to pogostol. A key intermediate in the synthesis of both natural products has been shown to be a chiral 4-hydroxy-4-methyl cyclohexanone. My project involves developing a method for the synthesis of (S)-4-hydroxy-4-methyl cyclohexanone.

This experience was simply amazing. I wanted to get involved in research as soon as possible, particularly because I found the standard chem labs rather bland. My graduate mentor has been an awesome person to work with as well. He managed to make sure I knew the chemistry I needed, and was always available for help. The same is true for the entire group. All the graduate students helped me quite a bit in addition to my mentor throughout the program. Honestly, I can't think of a lot to improve the research program. I certainly hope that it can continue and will suggest it to all motivated students.

Briana Lee

My project was to work on the synthesis of (-)-Reiswigin A starting from simpler compounds. This target molecule has been isolated from marine sponge and has anti-viral activity against Herpes simplex type I and Murine A59 Hepatitis.

The first couple of weeks, I assisted and learned how to use the equipment to do the reactions on my own. I learned basic techniques such as flame drying, using the rotovap, TLC analysis, using syringes and the oven, the proper way to clean glassware, and the important techniques such as distillation, refluxing reactions, and column chromatography. We also used the NMR to check the purity of our products. Since I was taking spectroscopy (Chem. 124), the process was doubly helpful. I learned so much more about laboratory work than in Chem. 6A. I really had to think of the best way to run a reaction without having a step-by-step list of instructions. I experienced what it is like working on my own, dealing with imperfect reactions, getting to even do t over again. It can be frustrating when reactions don't work or things break. However, it is rewarding to see how you can synthesize something pretty complex and from something simple. It was a good experience for me. I think that I deserve an [A] because I learned more than the average sophomore chemistry major and spent quite a few weekends working in the lab. This experience has helped me prepare for graduate school.

Eric Davalos

My project involved a new methodology for the synthesis of β-peptides in which no toxic metal reagents are used and the only byproduct produced is carbon dioxide. We have been able to form the β-peptide linkage with an isolated yield of 92%. β-peptides have been receiving immense interest because of the discovery that peptides composed of β-amino acids adopt novel secondary structures and often evoke a specific biological response.

The overall experience that I went through this past quarter was was truly amazing and I am very grateful that I had the opportunity to be apart of it. I would definitely recommend this experience to future students so long as they are aware of the time commitment involved and are serious about going to graduate school or some work in chemistry as a career. There are really no improvements that I could suggest for this program because I can not think of any weaknesses that exist for this program; it is what it is, actual research experience in an actual research group, nothing more, nothing less, and I think that's great. I learned many actual laboratory techniques and what it is like to be a part of a research group, both of

which I thoroughly enjoyed. As for my mentor, he was more than I could have ever hoped for in a mentor. He was completely knowledgeable and always willing to answer all my questions. He always made sure that I knew what I was doing and very easy to get along with and work with. We actually became pretty good friends during this experience and periodically get together out of the lab. To sum it up, the whole experience was really great. I knew since I entered college that undergraduate research was something that I wanted to become involved in, and this program has helped me do just that, and much earlier than I would have otherwise anticipated. Thank You

Michael Kwong

My project involved the determination and optimization of regioselectivity in a particular hydro-zirconation reaction of a terminal alkyne. I examined trimethyl-aluminum and four different zirconium catalysts in an attempt to optimize the reaction.

My graduate mentor was very knowledgeable. Anytime I would ask him a question, I would get an precise answer.. When performing the reactions the first time, he would guide me and answer my questions. I would recommend the program to future students. It is invaluable experience in the hood. At first, I was uncomfortable. There were tubes hanging from the top and so many connections. I did not know what hooked to what. Argon lines, vacuum, water, and air lines, they were all unfamiliar to me, but the more I worked the more comfortable I became. I learned how to keep reactions under inert gas. Because my work had real applications I felt that my efforts were really at the forefront of research.

Joe Moss

I am pursuing the synthesis of a multi-substituted bullvalene possessing 1.2 million constitutional isomers. It could have many applications such as finding new biological receptors.

When I started, I was clueless! I had to learn everything. I worked a lot. I spent between 25 and 35 hours each week in lab and I worked on many Saturdays. My graduate student mentor took a passive approach. He expected me to figure almost everything out on my own and gave me only a few hints when I asked. Many of the reactions were difficult and required several specialized skills. For example, I had to learn how to use the parr apparatus for a hydrogenation. Also, I had to learn how to make and handle diazo-methane. I had to crack di-cyclo-pentadiene into a monomer, relying only on the literature to guide me. My only complaint is the amount of work involved. No one seems to know the meaning of "free-time."

Adam Britto

My project was to synthesize a specific enantiomer of the natural product diplopyrone. Diplopyrone is a molecule of biological importance as it is a highly phytotoxic compound produced by the parasitic fungus Diplodia Mutila. The possible applications of it have not been greatly investigated as it was only isolated in only 2003. We chose to synthesize the compound using a novel methodology developed in our lab.

I found the research opportunity to be a great experience. I definitely learned a lot and feel like I now have the skills to work in a real lab. One of the best things about it was that I had my own project, which gave me insight into research. My mentor was great and I don't think there was anything that she could have done any better.

Elizabeth Bacon

My project is the synthesis of mitorubrinic acid. A dimer of mitorubrinic acid, called diazaphilonic acid, is a telomerase inhibitor. Telomerase is an enzyme responsible for regulating the length of the telomere in the DNA, and it's length determines how many times a cell can divide. Telomerase lengthen the telomere and enables the immortalization of cancer cells. Telomerase inhibitors are sought to cause cancer cells to expire without killing healthy somatic cells.

Working in this program was the best experience that I have had so far at UCSB. I learned basic techniques such as working with nitrogen, using syringes properly, how to monitor a reaction by TLC, how to run a silica column and how to take an NMR spectra. More importantly, I was able to explore possibilities in my major (i.e. organic chemistry) while getting credit for my efforts. One of the most significant parts of this program is the relationships that participants develop with the graduate students. I feel that I can approach anyone of them with a question. The biggest portion of my time this quarter has been spent working in lab. I now realized the enormous commitment that graduate school is. However I still have a desire to attend. In fact, I like my experience so much, that I have decided to continue next quarter (chem 199) and into the summer.

A refresher in scientific education (101)

Scientist verses Educator

Teaching organic chemistry, particularly laboratory skills is a unique experience, because organic chemistry introduces a real research field to a tremendous number of students who remain undecided as to their future goals, careers and interests. In the past three decades, two conflicting pedagogical approaches have emerged for higher education in the sciences and organic chemistry has often been their battleground. The goals of both pedagogical approaches have merit. One group (the scientists) aims to train future progeny, while the other group (the educators) aim to create a scientific literate public. Today, the educator philosophy has become the dominant style of teaching science at most large public universities in America. The reason is simple. The Scientists advocated teaching courses catered towards training future scientist, when a majority of the students attending those courses were not planning to become scientists. Educators, have been more student centered and less content focused. , choosing a descriptive and "active" learning process to help students learn on their own. The average students leaves organic and biochemistry with the ability to make informed decisions about DNA evidence, the rising costs of pharmaceuticals, the ethics of stem cell research, resources for the AIDS pandemic, the environmental repercussions SUVs, as well as a host of other issues with which a scientific literate voting public must grapple, but little else.

The Flaw

Visit any chemistry oriented company that employs B.S. chemists, and you will unfortunately find very few similarities with todays "teaching" laboratory. Educators would have liked to advocate real research, but have finally recognize that it is highly impractical. Therefore, the laboratory experience at most large colleges and universities is a process of "rediscovery" which reduces laboratory skills and techniques to following cookbook protocols. Industry has embraced this practice, because students trained to think critically and logically can overcome their deficiencies and inexperience at some latter stage. ***However, a tremendous sacrifice has been made by implementing this model.*** It was the satisfaction of the personal laboratory discovery process that turned the best and brightest students towards careers in science. Because these students, many who have an innate talent for scientific research, never experienced the actual research process, they chose other non scientific careers.

The solution

Companies such as 3M, Abbot laboratories, Clorox, Bristol Myers Squibb, Glaxo, Lilly, Merck, Norvartis, Sankyo and Wyeth will need outstanding (B.S.) students to survive in future competitive markets. Personal one-on-one attention is essential to provide the close guidance and rapid feedback required to work on original and untested experiments. *This is the setting that convinces students with an innate talent for science to become scientists.* The Department of Chemistry at the University of California at Santa Barbara has devised a uniquely creative solution to to solve these problems. Students are screened and hand selected to engage in real research problems during their formative years. With your contributions we intend to expand this program, so that these opportunities are available in other areas of research including materials, inorganic, biological and physical chemistry. **Please make a donation today.**