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GENETICS



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From the President's desk:

As the GSA marks its 75th anniversary, it is an honor and a privilege to serve as President of the Society. I gladly accept the challenge to keep the GSA moving in the right directions as we address the numerous issues facing us.

Open access publishing has transformed the landscape of scientific publishing. The GSA has enthusiastically embraced a policy of total open access. Available freely online are: preprints of accepted papers within days of acceptance; the Journal, three months after publication; and archives of all past issues. But with open access comes substantial financial threats because the bulk of the Society's revenues come from institutional (library) subscriptions to *Genetics*. If a substantial number of those subscriptions were cancelled, we would be forced to increase author charges and alter how we publish the Journal. While this has not happened yet, it remains unclear what the long-term impact of open access publishing will be as library budgets are increasingly squeezed.

Over the past century, the success of genetics in providing understanding of all areas of biology has blurred the definition and boundaries of the field. Geneticists are now also cell, developmental, neuro, and evolutionary biologists etc., and most investigators in other fields now incorporate genetic approaches in their studies. The rapid growth of new sub-disciplines like genomics and proteomics further expands what is encompassed by genetics. Consequently, our self-identification as "geneticists," which in the past provided the links and incentives for joining the Society has been eroded. But the advances and blurring of boundaries offers fresh opportunities for cross-fertilization, generation of new ideas and approaches, synergies for investigation and discovery, and greater integration among all investigators. The GSA is forging new links as we encourage geneticists of all stripes to join the GSA and help it evolve.

Our members have traditionally focused on analysis of model experimental organisms, with the GSA providing crucial support and sponsorship of the various model organism meetings. For many investigators, these successful organismal meetings supplanted the general GSA meeting: as attendance at the organismal meetings increased, the GSA general meeting declined until it was terminated in 1993. But in the current post-genomics era researchers increasingly find common ground regardless of the experimental system under investigation. This makes it imperative to promote communication among all members of our Society. To address this need, in January 2006 the GSA held a new general meeting, "Genetic Analysis: Model Organisms to Human Biology" in San Diego. The meeting was highly successful and clearly demonstrated the benefits of broader

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Dear Abbot:

Charles Darwin, the famous evolutionary biologist, and you were contemporaries. Was Darwin familiar with your research? Did you ever write or meet to discuss your research programs? Do you feel that your work had an impact on Darwin's, or his on yours?



Curious in Queens, New York

Dear Curious,

Unfortunately, Darwin and I never had the opportunity to exchange ideas. We moved in very different spheres, and I never traveled far from the abbey in Brno. Darwin's work was, of course, widely reported. He published several books and was an active member of a large community of naturalists, mostly in Great Britain. They exchanged samples they collected during their worldwide travels, wrote to one another regularly about their investigations, and had the resources to publish in venues with a much broader reach than those available to me. I was a member of the Natural History Society of Brno, a small city near Vienna, and my paper in the Society's Proceedings entitled "Experiments on Plant Hybridization" never received much attention. I sent Mr. Darwin a reprint, but I heard he never cut open the pages, and thus probably did not read my manuscript. In 1900 my work was discovered by William Bateson, but it was not until the 1930s and 1940s that people like Ronald A. Fisher, John B. S. Haldane and Sewall Wright explained the significance of the laws of inheritance to Darwin's theory of natural selection. One can only contemplate how an understanding of the mechanisms of mutation and inheritance would have advanced the theory of evolution during Darwin's lifetime and mine.

The Abbot

We highly recommend a visit to the Darwin Exhibit at the American Museum of Natural History in New York until May 29th. Curated by Niles Eldredge, the exhibit celebrates the life and scientific achievements of one of the most influential scientists who ever lived, Charles Darwin. The exhibit was planned to coincide with the 200th anniversary of Darwin's birth, February 12, 1809, and the 150th anniversary of the publication of the *Origin of Species*. One can see family portraits, a map showing the voyage of the Beagle, dioramas and even live exhibits of the types of animals and plants Darwin collected or described during his long career. A full-scale view of his "study" from Down House, the Darwin family residence is on display. One can imagine the difficult birth of "Origin of Species," as Darwin wrote the treatise that would change the world with a quill pen on a "desk" consisting of a wooden board designed to fit across the arms of his wheeled chair.

Among the many original documents on display, the "tree of life" diagram showing the relationships between various species of South American mammals and their fossil ancestors strikes the visitor with its modernity. The exhibit shows the development of Darwin's thoughts, eventually leading him to his revolutionary conclusion that "species are not immutable." As he writes in the introductory chapter of *Origin of Species*, "I can entertain no doubt, after the most deliberate study and dispassionate judgment of which I am capable, that the view which most naturalists entertain, and which I formerly entertained – namely, that each species has been independently created – is erroneous."

The Darwin exhibit does an outstanding job at presenting the human side of Charles Darwin and providing a taste of the incredible diversity of experimental explorations he undertook during the course of his life. If the exhibit is to be faulted, it is that no one example of Darwin's research is presented in sufficient depth to illustrate his thoroughness and the incredible volume of data supporting his theory. However, the details of Darwin's thought processes can be found in the excellent companion book to the exhibit, *Darwin: Discovering the Tree of Life*, by Eldredge, the exhibit curator. This volume provides a most thoughtful analysis of Darwin's writing and should be read by anybody interested in evolutionary biology and the history of science.

The exhibit will travel from New York to Boston, Chicago, Toronto, and London. For those who are unable to experience the exhibit first hand, an amazingly comprehensive sampling is available at the website <http://www.amnh.org/exhibitions/darwin/>.

by Stéphane Boissinot and Corinne A. Michels, Queens College, City Univ of New York



Slate for 2006 Election under Determination

The 2006 GSA Nominating Committee led by Susan L. Lindquist, Whitehead Institute, Cambridge, MA, is working on selecting a slate of candidates for the upcoming 2006 election of GSA Board representatives. Meeting by conference call with the other members of the Nominating Committee – William F. Dove, Univ of Wisconsin; David Begun, Univ of California, Davis; Anita Hopper (ex officio), Penn State Univ College of Medicine; and Elaine Strass, GSA Executive Director – Lindquist led the discussion to develop the upcoming slate. Watch for an e-mail alert in early June, initiating the electronic balloting process and connecting you to your confidential Web ballot. All directions for voting will be provided online.

GSA Board members leaving at the end of 2006 are: Terry Orr-Weaver, past president (2006), Anita Hopper, secretary, and Thomas Cline, Terry Magnuson, and John Postlethwait, directors.



From the President's desk:

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communication. Consequently, we are already planning the next meeting to be held in San Diego, January 5-9, 2008.

Mark your calendars now!

Guided by our recent past presidents, the GSA has also begun a number of other new initiatives:

- This newsletter you are now reading, which keeps you abreast of GSA activities.
- The creation of a senior editorial board, headed by Suzanne Sandmeyer, which is working with Journal editor, Beth Jones to give a facelift to *GENETICS* in organization and appearance (debuting in September) and to ensure the continuation of the Journal's high standards.
- A new Education Committee, chaired by Robin Wright, which is spearheading efforts to support undergraduate education and promote our members who are dedicated to excellence in teaching.

The GSA is must now build upon these initiatives, to grow and strengthen our Society. We want you to join us in these endeavors. If you are reading this newsletter and you are not yet a member, please join the GSA. Visit our website at genetics-gsa.org to learn more about the Society, our activities and the benefits of membership. If you already belong to the GSA, please maintain your membership. Pass this newsletter on to your colleagues and associates and encourage them to join, particularly students and postdocs (who are offered substantial discounts). They are the future of the GSA, but they currently represent just a fraction of our membership. It is *your* Society. Be an active member and tell us how the GSA can better serve your needs. Send us (society@genetics-gsa.org) your ideas for new GSA activities and initiatives. I look forward to serving the GSA and with your help, continuing to build a society that will remain at the forefront of genetics for the next 75 years and beyond.

Sincerely,

Barry Ganetzky



From the May Issue of GENETICS

by R. Scott Hawley, Stowers Institute of Medical Research

Here are several articles in the upcoming issue of *GENETICS* you can look forward to reading:

Title: Suppressor analysis of a histone defect identifies a new function for the Hda1 complex in chromosome segregation

Authors: Hasna Kanta, Lisa Laprade, Abeer Almutairi, and Inés Pinto

Chromatin structure influences chromosome segregation, but how? Perhaps not surprisingly, histone acetylation seems to play a role. Certain mutations affecting histone H2A cause chromosome segregation defects, apparently as the result of a defect in kinetochore function. To identify proteins that interact with histone H2A, the authors devised a clever screen for suppressors of an H2A mutation, which turned up three subunits of the histone deacetylase. All three Hda proteins show association with centromeric DNA. *HDA3* shows genetic interactions with kinetochore components, emphasizing its role in centromere function.

Title: Regulation of hyphal morphogenesis and the DNA damage response by the *Aspergillus nidulans* ATM homologue, AtmA

Authors: Iran Malavazi, Camile P. Semighini, Marcia R. Z. Kress, Steven D. Harris, and Gustavo H. Goldman

The human disease Ataxia telangiectasia is characterized by progressive loss of motor function and susceptibility to cancer. These authors characterized the homologue of ATM (*AtmA*) in *Aspergillus nidulans*. In addition to its expected role in the DNA damage response, they found that it is also required for polarized hyphal growth. This is a surprising defect for a mutant in a gene primarily associated with DNA repair. The *atmA* mutant fails to generate a stable axis of hyphal polarity, and its cytoplasmic microtubules are highly disorganized at the hyphal tip. These results suggest a possible explanation for some of the phenotypes of the human neurodegenerative disease Ataxia Telangiectasia that cannot be directly related to a disorder in DNA repair. These findings should stimulate a re-examination of cytoplasmic defects in *atm* mutants of other species.

Title: The mushroom body defect (*mud*) gene product is an essential component of the meiosis II spindle apparatus in *Drosophila oocytes*

Authors: James X. Yu, Zhonghui Guan, and Howard A. Nash

Here is another case of a surprising phenotype. The Mud protein is a well characterized component of the mushroom body, a part of the *Drosophila* brain that is essential for multiple higher brain functions, including learning, olfaction, and memory. Why then, are mud mutants female-sterile? These authors show that *mud* females are defective in meiosis II, when their two component spindles fail to cohere and align properly. The Mud protein is associated with the central spindle pole body that lies between the two spindles of meiosis II. Could it be that defective brain development in *mud* mutants is due to the role of Mud protein in meiosis?

Title: A deficiency in the region homologous to human 17q21.33-q23.2 causes heart defects in mice

Authors: Y. Eugene Yu, Masae Morishima, Annie Pao, Ding-Yan Wang, Xiao-Yan Wen, Antonio Baldini, and Allan Bradley

Patients who carry deletions of 17q21.3-q24 exhibit distinct phenotypes, including heart defects. In a *tour de force* of genetic engineering the authors created the analogous deletion of this region of the mouse genome. Heterozygotes displayed heart defects similar to those of humans deleted for 17q21.3-q24. Thus, the authors have identified a new dosage-sensitive region of the genome that may be critical for normal heart development in both mice and humans.

New Members Chosen by NAS

Congratulations to GSA President, Barry Ganetzky, University of Wisconsin, Madison and immediate Past President Terry Orr-Weaver, Whitehead Institute, MIT on their election last month to the National Academy of Sciences. Other GSA members elected to the NSA this spring were Joseph R. Ecker, Salk Institute, San Diego; David H. Haussler, HHMI and Univ. of California, Santa Cruz; and Anthony A. James, University of California, Irvine.

These new members are among the current roster of 2013 active members and 371 foreign associates, elected to the NAS in recognition of their distinguished and continuing original scientific research. "Election to the Academy is considered one of the highest honors in American science and engineering," said Ralph Cicerone, president of the Academy.



At 90: Jim Crow and a Lifetime in *GENETICS*

by Phyllis Edelman, *GENETICS* Managing Editor



Belated birthday greetings are in order for GSA member, James F. Crow and the GSA Journal, *GENETICS*. In a recent phone interview, Crow, professor emeritus, University of Wisconsin-Madison, recounted how both he and the *GENETICS* Journal share a common birth year, 1916. They were, he said, supposed to have both been born in January, “but I came out on time and the Journal was late.” Although dated, “January” the first issue of the Journal wasn’t mailed until March 10.¹ Crow’s life and the Journal’s have intersected numerous times in the past 90 years, and both belie their age.

Known for his work in population genetics, specifically the effect of mutation on the nature of a population, Crow joined GSA in 1940 when he was a graduate student at the University of Texas. At that time *GENETICS* wasn’t the official publication of the GSA; that happened later, in 1963.² In the decade prior, however, from 1952-1956, Crow was associate editor, along with R. A. Brink as editor. In those days, Crow said, the Journal “was a really low-budget operation. Brink and I were collecting subscriptions and proofreading” in addition to accepting, rejecting and editing manuscripts. “The cost for the Journal was \$6.00 per year and we raised it to \$8.00,” Crow added. Today, subscription dues are collected by the GSA administrative staff, while copyediting and proofing is done by a team of scientific editors at the Journal’s press, Dartmouth Journal Services. A subscription to the Journal is now a benefit received with GSA membership.

“The overall style of the Journal hasn’t changed much,” Crow said. And while “the nature of the subject has changed, the content itself has not changed. The Journal is still a repository of solid research,” Crow added.

Crow also noted that when he was associate editor, G. H. Schull, the first editor of the Journal was still alive and still reading the Journal. “If we wrote something and he didn’t like it, we heard from him,” Crow added.

In addition to his association as an editor of the Journal, Crow has had numerous scientific articles published in *GENETICS* beginning with his first significant article in 1948 on hybrid vigor. He’s published nearly 30 scientific articles in *GENETICS*, and, the body of knowledge he has contributed to genetics and to the Journal increases exponentially when one considers the number of students and postdocs he has nurtured over the years, which exceeds 50. Among them are many investigators well-known to the readers of the Journal including Newton Morton, Motoo Kimura, Yuichiro Hiraizumi, Larry Sandler, Seymour Abrahamson, Joe Felsenstein, Takeo Maruyama, Terumi Mukai, Dan Hartl, Bruce Baker, Mike Simmons, Russell Lande, Chuck Langely, William Engels, Tom Nagylaki, James Bull, Chung I. Wu, Alexey Kondrashov and still others too numerous to mention.

In the late 1980s, Crow began a long-standing relationship with the Journal that continues today. Jan Drake was editor of the Journal and wanted to initiate some perspective pieces. According to Crow, Drake asked him because, “you are someone who can meet a deadline.” Crow generally works on pieces with his co-editor and University of Wisconsin colleague, William F. Dove. “Sometimes editing them is a bit of a burden, but pretty much it’s been a joy,” Crow said. Perspectives in the Journal have included the anniversaries of important, ground-breaking papers, the birth of important contributors or other significant events in the field of genetics.³ The actual topics for the Perspectives articles are decided upon by Crow and Dove (i.e., “the birds”) and according to Crow are pretty much “freewheeling.” Although Crow and Dove usually ask others to write the Perspectives article, Crow notes that when someone falls through, he often fills in.

Although print is Crow’s usual medium, in recent years he’s branched out to DVD. In 2000, Daniel L. Hartl (Harvard University), a past president of GSA and a former student of Crow’s interviewed him for the GSA oral history series, “Conversations in Genetics.” In this DVD, Crow reflects on his career, and his associations with some of the geneticists who developed the foundation of modern genetics, including H. J. Muller and Sewall Wright, and some of his students, including Motoo Kimura, with whom he had a long and productive relationship.

Crow is officially retired from the University of Wisconsin, where he taught from 1948 to 1986. He still has an office there and continues to work on a small research project with graduate students. Later this month, he will be honored at the Fourth Symposium on Human Biology to be held at the University, May 22-25.

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¹ Crow, J. E., 1991 *Our Diamond Birthday Anniversary*. *Genetics* **127**: 1-3.

² *Ibid.*

³ Crow, J. E., and W. F. Dove, 1998 *Birds’ Eye View: A Decade of Perspectives*. *Genetics* **148**: 1405-1407.



A Report of the 2006 Drosophila Meeting

The Flies of Texas Were Upon Us

by R. Scott Hawley, (Stowers Inst of Medical Research, Kansas City, MO)

This year nearly 1500 Drosophila researchers converged at the Hilton Americas Hotel in Houston, Texas for the 47th Annual Drosophila Research Conference. The meeting began Wednesday afternoon, March 29 with a Drosophila Board session chaired by the current president, Mark Krasnow (Stanford Univ). The meeting program kicked off with an evening talk on "A Century of Drosophila: 100 Years and Counting" by Thom Kaufman, (Indiana Univ, Bloomington). Kaufman did a phenomenal job of portraying both the history of Drosophila genetics and the major events that led to our current understanding of the developmental genetics of Drosophila. The presentation was augmented by clips from a successful science fiction television show demonstrating how even the most obscure of fly mutants have become a part of our culture. Kaufman's presentation was followed by the presentation of the Larry Sandler Award to Daniel Ortiz-Barrientos (Indiana Univ, Bloomington) for his work on the molecular genetics of speciation. This award continues to honor the memory of one of the great teachers and chromosome biologists to practice the craft, Professor Larry Sandler (University of Washington.)

The organizing committee for this year's meeting consisted of Hugo Bellen (Baylor College of Medicine, Houston), Ron Davis (Baylor College of Medicine), Georg Halder (The Univ. of Texas, M. D. Anderson Cancer Ctr., Houston) and Graeme Mardon (Baylor College of Medicine). Assistance from the GSA was provided by Suzy Brown. Together they assembled a meeting consisting of two superb plenary sessions (including a wonderful movie about the current controversy regarding teaching evolution by Sean Carroll), 18 platform sessions encompassing 136 talks, and 13 workshops. There also were more than 800 poster presentations covering the entire range of fly research. The abstracts for these talks and posters can be found online at <http://www.drosophila-conf.org/genetics/dros06/dros06s/>.

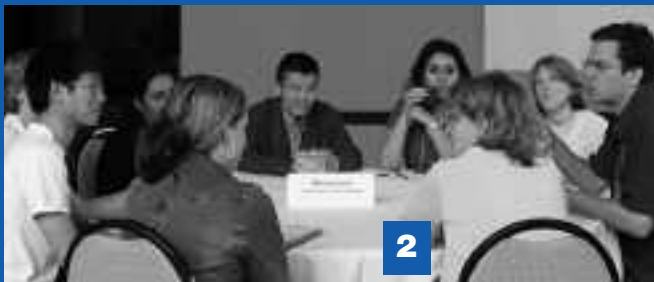
This year the GSA poster awards were given to Hillary K. Andrews (Baylor College of Medicine), Zhe Han, (University of Texas SW Medical Ctr., Dallas) and Andrea Hutterer (Inst of Molecular Biology, Vienna, Austria). Their abstracts can be read by following the Internet links at <http://genetics.faseb.org/genetics/g-gsa/s-awards.shtml>. In addition, the Drosophila Image Award, sponsored by the GSA and by the Drosophila Board was given to K.-I. Kimura, M. Ote, T. Tazawa, and D. Yamamoto for their beautiful image of a cluster of neurons in the Drosophila brain that expresses the fruitless gene. This image and those of the runner-ups, can be viewed at <http://www.drosophila-images.org/2006.shtml>. These images are stunning and well-worth the Internet excursion.

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GSA Mentor Roundtable Session



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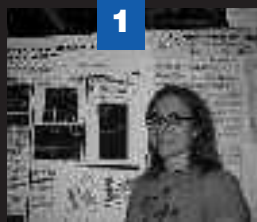


2

1 Allan Spradling, GSA Vice President, gives career guidance to students at the GSA Mentor Roundtable.
2 Students and mentors exchange information during the Mentor Roundtable session.

1 Hillary K. Andrews, Baylor College of Medicine, Houston, TX, standing by her poster received the First Prize of \$500. 2 Zhe Han, University of Texas SW Medical Center, Dallas, TX, left, receives his Second Prize Award of \$300 from Mark Krasnow, Stanford University, and president of the Drosophila Board. 3 Andrea Hutterer, Institute of Molecular Biology, Vienna, Austria, standing by her poster received the Third Prize of \$200.

Students Receiving the GSA Poster Awards



1



2



3



Sean Carroll gave a spirited and inspiring session on fly evolution.



David Sutherland, left, of FlyBase in Cambridge, England and William Gelbart, Flybase, Harvard University, greet each other at the FlyBase demonstrations held at the DROS meeting.



Hugo Bellen, Baylor College of Medicine, Houston, and one of the organizers of the 2006 Drosophila Conference, irons out some details with Allan Spradling, Carnegie Institution of Washington, Baltimore, MD and GSA Vice President.

Scott Hawley, left, chair of the Larry Sandler Memorial Lecture Selection Committee, congratulates Daniel Ortiz-Barrientos, Indiana Univ, recipient of the 2006 Larry Sandler Award.



Mel Green, left and Ken Burtis, center, both of Univ of California, Davis, share a moment of camaraderie with Thom Kaufman, Indiana Univ.



Some of the exhibitors demonstrating their products and services at the Drosophila Conference in Houston.



Here is a sampling of the more than 800 poster presentations at the DROS meeting.





Outreach to Teach: The Mentor Network

by Kenna Mills Shaw, GSA/ASHG Education Director

As a GSA member you are likely to be experienced at teaching genetics to undergraduate or graduate level students. But have you ever thought about imparting your knowledge and love for genetics to students at a younger level? If the answer is “yes,” then The Mentor Network at <http://www.GenEdNet.org> can help you hook up with a K-12 classroom in your community whose teacher would like assistance in providing genetics education opportunities.

The Mentor Network was originally formed in 2003 as a contribution by the American Society of Human Genetics to the national celebration of DNA Day, which commemorated the completion and publication of the human genome sequence. The objective of the Mentor Network was to get geneticists into classrooms to help explain to school children the importance of genetics and of sequencing the human genome. Since 2003, DNA Day has become an annual event in April, and the Mentor Network now includes more than 1,200 geneticists, counselors, clinicians and advocates as mentors.

Thanks to the Mentor Network, geneticists now can provide outreach to K-12 classroom teachers all year long. Initially tapping directly into the ASHG membership for volunteers, GSA members can also become volunteer genetics educators within their communities.

Signing Up as a Mentor

Becoming a member of the Mentor Network is simple. Just visit www.GenEdNet.org, click on Mentor Network and then select, “To become a mentor” at the bottom of the page. After filling out your contact information, you will immediately be added to the publicly available list of mentors willing to visit a school in your area.

While most mentor-scientists are rarely at a loss for words on genetics, adapting content and approach from an undergraduate or graduate level to a K-12 classroom can be a challenge. Depending on grade level and statewide curriculum standards, teachers requesting mentors in their classrooms often have very specific topics they would like covered in a mentor's visit. It is important that a mentor's presentation encompass the topic(s) requested and do so in a way to ensure that state curriculum standards are sufficiently addressed.

What to Talk About?

To assist mentors and teachers in developing lesson activities, the Genetics Education Clearinghouse (GEC) is under development. The Clearinghouse, available at www.GenEdNet.org is a free, open-access resource for anyone interested in determining specific state science standards that cover topics in genetics. All science standards on genetics (including classification, biodiversity, central dogma, evolution, gene regulation and heredity) for the United States and Canada are searchable by state (or province) and grade level. Each of these standards is linked to websites that provide guidance on the content and possible ideas for lesson plans or activities. This resource allows, for example, a mentor in Wyoming to identify possible topics to cover with a third grade class, or for a geneticist in Florida to teach appropriate topics to a ninth grade biology class.

Sign up today to become a mentor at <http://www.GenEdNet.org>. Become one of a growing number of geneticists who provide personal learning opportunities for K-12 students!

A Report of the 2006 Drosophila Meeting **The Flies of Texas Were Upon Us**

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A major emphasis, added this year, was on stressing the roles of both the GSA and the Drosophila Board in organizing these meetings and facilitating the common activities of the Drosophila community. Attendees were urged to learn more about the Board and its activities, both by familiarizing themselves with the Board's activities, contacting their regional representatives, and by reading the minutes of recent Board meetings. The Board especially seeks the assistance of the community in helping to propose and select sites for future meetings and in preparing the semi-annual "white paper," which sets forth the goals of the community. More information about the Drosophila Board can be found at <http://flybase.bio.indiana.edu/.data/docs/DrosBoard/>.

If there was a single 'take-home lesson' from this year's meeting, it was the degree to which the once separate factions within the fly community are now inextricably intertwined. Population biology and evolution papers now share techniques, space and authors with those in categories such as developmental biology or mitosis and meiosis. The neuroscience segment of our community continues to grow as do the group committed to using flies as a system for exploring behavior, learning, memory, and even cognition. It was a terrific meeting; a toast to the organizers and to next year in Philadelphia!



Genomics in the Undergraduate Curriculum: The Matrix Reloaded

by Philip Meneely, Haverford College, Haverford, PA

Although many of us teach a course in which students do BLAST searches, BLAST is probably one of our least understood teaching tools. We tend to have our students simply paste sequences into the box, hit "BLAST!" and look at the top hits. In developing an undergraduate course in computational genomics, I learned that many interesting principles in genetics, molecular biology, and evolutionary biology lurk below the surface of the BLAST! button.

Students taking my course, Computational Genomics, have completed prerequisite courses in genetics, molecular biology, and biochemistry. Many have also had probability and statistics, but very few have had computer science courses. The class meets twice a week and uses a workshop format: I lecture for about an hour on one day and then demonstrate examples on the computer before giving homework problems. The students work together to solve the problems and present their results at the next class.

In terms of genetics education, the substitution matrix in BLASTP is important and may be my favorite topic to teach. Here we meet assumptions about the evolution, structure, and function of amino acid sequences. The substitution matrix is found about the middle of the page on the NCBI site at <http://www.ncbi.nih.gov/>, with default setting BLOSUM62. The role of the substitution matrix is to assign points to each position in an alignment. If a certain position has an alanine in both of the aligned sequences, the substitution matrix assigns a point value to that match; if one sequence has alanine and the other has leucine, the mismatch is also given a score. The matrix itself is a 20 x 20 grid, symmetrical about the diagonal where each amino acid matches itself.

I begin my lecture on the substitution matrix by asking students which amino acids they imagine can substitute for one another and which ones cannot without impairing the function of the protein. Nearly all students recognize that cysteines are important and unlikely to be replaced; they usually realize that hydrophobic amino acids might replace one another but hydrophobic amino acids probably do not replace charged residues. Then I explain how the matrices were compiled using the sequences of naturally occurring proteins, and have them examine the matrix in detail. The comparison of their imagined matrix with the actual matrix both reinforces their understanding of proteins and causes them to re-think some assumptions. The math of the substitution matrix is not very complicated and leads naturally to the concept of an alignment score. Converting the alignment score to an *e* value requires more knowledge of probability and statistics, so the students tend to accept my explanation. But now, when they look at their top hits, they have confidence that these really are the most similar proteins.

I have become so convinced of the value of the substitution matrix for teaching basic evolutionary principles that I am currently teaching a genomics class for freshmen who have had no college biology. I am using the matrix to teach fundamental principles about types of amino acids and the connection between amino acid sequences and protein structures. It is too soon to know if this approach will work for these beginning students, but since the class is small, any potential educational disasters can probably be managed. But the substitution matrix allows us to pose a simple question: why not let evolution teach us what happens in nature?

Useful Reference: Eddy, S.R. *Where did the BLOSUM62 alignment score matrix come from?* Nat Biotechnol. 2004 Aug;22(8):1035-6.

DROSOPHILA AND SMALL INSECT CHAMBER

Incubators with controlled temperature, lighting, and humidity for research with drosophila, mosquitos, aphids, wasps, etc. Chambers have a 5–40° C temperature range, coated coils, RH meter, casters...and a range of other features, depending on the level of sophistication needed. Six sizes (from 6 c.f. to 72 c.f. capacity) and four levels of temp/humidity control. Mini walk-in sizes are available for behavioral studies.



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President's Science Advisor to Speak at Yeast Meeting

The organizers of the 2006 Yeast Genetics and Molecular Biology Meeting are pleased to announce that John H. Marburger III, Science Adviser to the President and Director of the Office of Science and Technology Policy, will present the keynote talk on Thursday, July 27. The meeting, which runs from July 25th – 30th, will be held at Princeton University, NJ.

Marburger, a physicist by training, is the former director of the Brookhaven National Laboratory and served as president of the State University of New York at Stony Brook for 14 years (1980-1994). Other featured speakers and award winners include:



John H. Marburger, III

- Fred Sherman (University of Rochester), the recipient of the Lifetime Achievement Award;
- Kim Nasmyth (University of Vienna), delivering the Lee Hartwell Lecture;
- Chris Guthrie, (UCSF), presenting the Winge-Lindgren Address;
- Charlie Boone (University of Toronto), recipient of the Ira Herskowitz Award.

There's still time to register in advance at the GSA Yeast Meeting website, <https://genetics.faseb.org/yeast06r/reg.htm>. Deadline for the Advanced Meeting Registration and Housing is June 23, 2006. Abstract submission is closed.

For more information, check the Yeast Meeting website at <http://genetics.faseb.org/genetics/yeast/>. We look forward to seeing you in Princeton this summer.

Public Policy Update

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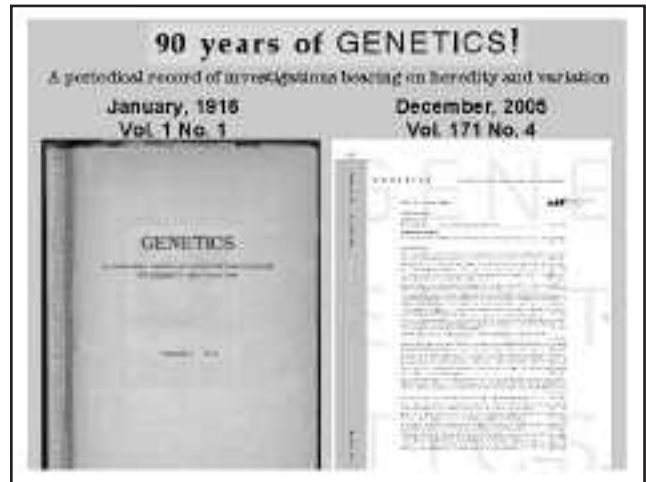
Senators Arlen Specter (R-PA) and Tom Harkin (D-IA) to increase funding by \$7 billion for those sections of the budget that provide funding for the NIH was overwhelmingly approved by the full Senate (The JSC thanks GSA members who responded to our requests to call your congresspersons to encourage them to vote for the Specter-Harkin amendment!).

The real funding challenge is expected in the House of Representatives. The House has to agree to the Specter-Harkin amendment and judging by past years, this is unlikely. A House increase in NIH funding would have to be reflected in House and Senate Appropriations Committees' allocation for the Labor-Health and Human Services Appropriations Subcommittee. The House climate, as opposed to the Senate, is chilly toward NIH funding increases. Conservative members have called for the need to balance the budget in five years with the suggestion that NIH funding be cut by 10 percent.

The JSC, through the Congressional Liaison Committee, will call on you to write or call your congressional representative as the budget continues to be debated. Your voice is needed in this debate. The biomedical science community is just one of hundreds of organizations, communities, societies, and interests groups vying for increased funding in a limited federal budget. If members of Congress don't hear from you, they won't perceive any consequences for voting in favor of NIH budget cuts. They need to know there are constituents who care how they vote on NIH. In the meantime, as members of the CLC, we will keep you posted on what is happening in Congress.

Jim Crow at 90

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Meanwhile, *GENETICS* continues to thrive as a healthy, well-respected journal, publishing over 500 research articles in 2005. It experiences a 7-10% steady annual growth rate in submissions, and has a team of more than 80 associate editors representing a wide range of genetics research and interests.

*Editor's Note: For more information about the **Conversations in Genetics** with Jim Crow and the **GENETICS Journal**, visit the GSA Web site at <http://www.genetics-gsa.org/>*



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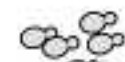
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¹Tong *et al* (2001) *Science* **294**, 2364–2368

²Pan *et al* (2004) *Molecular Cell* **16**, 487–496

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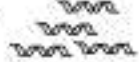
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Public Policy Update

by Lynn Marquis, Joint Steering Committee for Public Policy

President Bush States Strong Support for the Physical Sciences

In his State of the Union Address, President Bush called for an ambitious plan to increase the federal investment in science and education. The *American Competitiveness Initiative* commits \$5.9 billion in FY 2007, and more than \$136 billion over the next 10 years, to increase investments in research and development (R&D), strengthen education, and encourage entrepreneurship and innovation.

The Joint Steering Committee for Public Policy (JSC) applauds the President's enthusiasm for funding increases at the National Science Foundation (NSF) and the Department of Energy's Office of Science. The JSC has been working for years to raise awareness and funding for the NSF and will continue to work with members of Congress as they consider the President's initiative.

While we are pleased to see the President embrace the physical sciences and science education, absent from his proposal was the need to support the National Institutes of Health (NIH). We have entered an era when science is truly interdisciplinary and the breakthroughs in one field contribute to advances in another. If we want to continue our global dominance in science the U.S. needs to maintain a broad research portfolio that includes the biological sciences and the research work performed at NIH.

NIH's On-Going Budget Battles

While the future of the NSF burns bright, the JSC continues to be concerned with the stagnant budgets proposed for the NIH for the past several years. In February, President Bush submitted to Congress his budget recommendations for the Fiscal Year 2007 (FY 07). In it, he proposed to fund NIH at \$28.587 billion, the same funding level as the FY 06 budget. If the President's budget is accepted in Congress, it will be the third year that funding for the NIH has not kept pace with inflation.

Now it's Congress' turn to work on the budget and initial actions have been promising. In mid-March, an amendment offered by

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