



WSS NEWS

WASHINGTON
STATISTICAL
SOCIETY

June 1993

WSS ANNUAL DINNER

The WSS Annual Dinner will be held on Wednesday, June 16, 1993, at Laporta's Restaurant, 1600 Duke Street, in Alexandria, VA (3 blocks from the ASA Headquarters). Come by car (free parking) or Metro (convenient to King Street Station on the Yellow-Blue Lines).

One of the most enjoyable and beneficial parts of WSS membership is the excellent opportunity it provides for informal one-on-one interactions with colleagues. The Annual Dinner is an excellent excuse for tossing aside the demands of everyday work and taking a couple of hours to catch up with old friends and make new contacts.

In addition to a delightful meal at one of Alexandria's well-recognized restaurants, the after-dinner speaker will be the dynamic Civil Rights and criminal law attorney, Dorothy Nelmes. Results of the recent WSS election will also be announced and several award presentations will be made, including the Julius Shiskin Award for Economic Statistics and the Curtis Jacobs Award for Outstanding Statistics Projects at area schools.

If you have not yet signed up, send in your blue flyer (enclosed) today. Hope to see you there!

CURTIS JACOBS MEMORIAL AWARD

The winners of the 1992-1993 Curtis Jacobs Memorial Award, sponsored jointly by the WSS and the American Statistical Association, were **April Dawson, Indrid Elmore, Heather Gardner, and Tanika Hall**. The youngsters are 7th grade students of Sheila A. LoCastro, at Kettering Middle School in Upper Marlboro, MD. (Continued on page 2.)

WSS SEMINARS

(All events are open to any interested persons.)

JUNE

2	Wed.	Testing for Non-monotone Dose Response Curves Using a Slope Process
8	Tues.	How Well Can IRS Count the Population?
9	Wed.	A Federal CASIC Research Agenda
16	Wed.	WSS Annual Dinner
17	Thurs.	Trust and the U.S. Statistical System: A TQM Approach with an IRS Perspective (2nd in series)
23	Wed.	Resolution of the Lindley Paradox in Bayesian Hypothesis Testing

Announcements

Jacobs Memorial Award (cont'd)

The Curtis Jacobs Award is given to Washington-area middle and high school students who have entered a statistics project which best demonstrates the role of sample surveys in gathering information. This year's winners conducted a survey of the musical tastes of 7th and 8th graders at their school. The entry displayed a good understanding of many of the fundamental steps needed to conduct a high quality survey -- frame construction, sampling, nonresponse follow-up, and clear reporting of the findings.

The winners will be guests of the WSS at the Annual Dinner this year, where they will be presented their prize.

WSS and ASA are accepting additional donations to the Jacobs Memorial fund, in order to maintain the program at its current level. Your tax deductible contribution may be sent to Penny Young, American Statistical Association, 1429 Duke Street, Alexandria, VA 22314-3402.

Public Health Conference

The National Center for Health Statistics, Centers for Disease Control and Prevention will sponsor a public health conference on records and statistics -- Toward the Year 2000: Refining the Measures -- on July 19-21, 1993, at the Mayflower Hotel, Washington, DC. The conference will focus on health statistics refinements needed for better understanding health status and its determinants for the nation's population. Sessions will be organized around the following three key areas: increasing span of healthy life, measuring health disparities and assessing preventative and primary health services.

There is no registration fee, but preregistration is recommended. A conference proceedings will be made available to all attendees. For more information, call the Program Development Staff at (301) 436-7122 or fax (301) 436-4233. TDD service is available through local telephone companies or by calling (1-800) 735-2258.

QL Update

Montgomery County -- Participated in the career day at Wheaton Wood Elementary School, held on April 26, 1993, by speaking to 4th grade students about careers as a statistician. For more information on QL activities in Montgomery County, contact Mamdouh A. Sharara at (301) 405-3087.

The WSS seminar on "Activities-based Statistics: Quantitative Literacy for the College Classroom," presented by Elizabeth Eltinge, with Virginia Stallings-Roberts discussing, was very well received and generated lively audience participation. One suggestion was to create an E-mail network to share ideas and stimulate further discussion. If you are interested in such an activity, call Ron Fecso at (703) 235-5213 (ext. 142).

SPECIAL NOTICE...

In order to avoid conflict with the International Conference on Establishment Surveys (ICES), the June meeting of the WSS Executive Board will be held Tuesday, June 22, 1993, from 12:30 - 2:00 PM at the BLS Cognitive Lab, Postal Square Building. This is the joint meeting of the old and new Boards. Visitors are welcome -- come and we'll sign you up for something!

(Continued on page 8.)

Program Abstracts

- Topic:** Testing for Non-monotone Dose Response Curves Using a Slope Process
- Speaker:** Dean Follmann, National Heart, Lung and Blood Institute
- Chair:** Barry I. Graubard, National Cancer Institute
- Date/Time:** Wednesday, June 2, 1993, 11:00 AM - 12:00 Noon
- Location:** Conference Room G, Executive Plaza North, 6130 Executive Blvd., Rockville, MD (Red Line -- White Flint; approximately 1 mile)
- Sponsor:** Division of Cancer Prevention and Control, National Cancer Institute and Public Health and Biostatistics Section, WSS
- Abstract:** This talk proposes methodology to detect "J"-shaped dose response curves. The sequence of standardized least squared slopes, sequentially computed from 2, 3 ..., n ordered doses, is shown to converge to a Gaussian process with independent increments, and, hence, transformable to Brownian Motion.

Since the location of the minimum of the response curve will not, in general, be known, we consider functionals of the slope process conditioned on the last crossing of the horizontal axis. Asymptotically, this tied-down process can be transformed to a Brownian Bridge. We evaluate the area and maximum of this tied-down slope process as statistics that test monotonicity of the dose-response curve. Small sample versions of the tests, which condition on crossing and the absolute value of the process after the crossing, are considered and their null distribution derived. Power of the proposed test statistics is evaluated and compared with a naive "optimal" test that uses the slope process at the single dose that gives the largest power. This test requires knowledge of the "optimal" dose. For realistic "J"-shaped curves, the test statistics based on the tied-down process performed at least as well as the naive optimal test.

Program Abstracts (cont'd)

Topic: How Well Can IRS Count the Population?

Speaker: Peter Sailer, Internal Revenue Service

Discussant: Greg Robinson, Bureau of the Census

Chair: Lois Alexander, Social Security Administration (Retired)

Date/Time: Tuesday, June 8, 1993, 12:30-2:00 PM

Location: BLS Cognitive Lab, Room 2990, Postal Square Building, 2 Massachusetts Ave., NE, Washington, DC. (Red Line -- Union Station) Enter at Massachusetts Ave. and North Capitol Street. Federal government employees show ID; nongovernment employees call Ed Riddick at (202) 606-7376 by June 3 to add name to visitors' list.

Sponsor: Social and Demographic Section

Abstract: Data presented at the 1992 ASA meetings indicated that a very large percentage of the United States population was covered either by tax returns (as filers or dependents) or by information documents filed by the individuals' employers or other payers. This paper, co-authored with Barry Windheim and Ellen Yau, further refines the estimates presented last year, by providing additional information on the overlap between tax return filers, dependents, and information document recipients. It also shows distributions of the IRS "population" by age and compares these distributions to data from the 1990 Census.

Program Abstracts (cont'd)

Topic: A Federal CASIC Research Agenda

Speakers: Fred Conrad, Bureau of Labor Statistics
Bill Mockovak, Bureau of the Census
David Uglow, Bureau of Labor Statistics
Cathy Burt, National Center for Health Statistics

Chair: Cathryn S. Dipppo, Bureau of Labor Statistics

Date/Time: Wednesday, June 9, 1993, 12:30 - 2:00 PM

Location: BLS Conference Center, Meeting Rooms 7 and 8, Postal Square Bldg., 2 Massachusetts Avenue, NE, Washington, DC. (Red Line -- Union Station) Enter at First Street. Federal government employees show ID; nongovernment employees contact Ed Riddick at (202) 606-7376, by no later than June 4, 1993, to add name to visitors' list.

Sponsor: Data Collection Methods Section

Abstract: Many Federal government surveys are being transformed from paper and pencil to computer-assisted administration. A number of problems can arise during this transition. In order to both understand and solve these problems, four interagency teams were created to develop a research agenda. This seminar will focus on the proposals from these four teams:

- Procedural Aspects — Fred Conrad
- Training Issues — Bill Mockovak
- Human Computer Interaction — David Uglow
- Motivational and Organizational Issues — Cathy Burt.

Program Abstracts (cont'd)

Topic: Trust and the U.S. Statistical System: A TQM Approach with an IRS Perspective
(2nd in series)

Speaker: Fritz Scheuren, Internal Revenue Service

Discussants: Rich Allen, National Agricultural Statistics Service
Lorraine Amico, National Governors Association

Chair: Janet Norwood, The Urban Institute

Date/Time: Thursday, June 17, 1993, 12:30-2:00 PM

Location: BLS Conference Center, G-440, Meeting Rooms 7 & 8, Postal Square Building, 2 Massachusetts Ave., NE, Washington, DC. (Red Line -- Union Station) Enter at First St. Federal government employees show ID; nongovernment employees call Ed Riddick at (202) 606-7376 by June 14 to add name to visitors' list.

Sponsor: Quality Assurance Section

Abstract: In April, Janet Norwood addressed the Washington Statistical Society, discussing her experience with the Federal statistical system and describing her view of prospects for its future. This session is part of an effort to continue the dialogue which Norwood began, in an attempt to "re-engineer" the statistical system.

The speaker, still an advocate of Total Quality Management, will discuss some specific ideas he has for changing our process of doing business, so as to improve cooperation and trust among the statistical agencies -- and with the public -- while maintaining our current decentralized system and taking advantage of the technological innovations that abound. The need for benchmarking, customer-driven change, stronger customer-supplier relationships, and a common vision will be discussed in the context of some of the major statistical problems we face, including privacy and record linkage.

Program Abstracts (cont'd)

Topic: Resolution of the Lindley Paradox in Bayesian Hypothesis Testing

Speaker: K.R.W. Brewer, Australian National University

Discussant: Nozer Singpurwalla, George Washington University

Chair: Phil Kott, National Agricultural Statistics Service

Date/Time: Wednesday, June 23, 1993, 2:00 - 3:30 PM

Location: BLS Cognitive Lab, Postal Square Bldg., Room 2990, 2 Massachusetts Avenue, NE, Washington, DC. (Red Line -- Union Station) Enter at Massachusetts Ave. and North Capitol Street. Federal government employees show ID; nongovernment employees contact Ed Riddick at (202) 606-7376, by no later than June 18, 1993, to add name to visitors' list.

Sponsor: Methodology Section

Abstract: When a simple null hypothesis is tested against a composite alternative in a non-Bayesian framework, it is sufficient to specify the two hypotheses as (say) $H_0 : \theta = \theta_0$ and $H_1 : \theta \neq \theta_0$. For a Bayesian hypothesis test, however, it is necessary to specify a prior probability over the entire permissible parameter space.

Unfortunately, the posterior probability associated with H_0 is highly sensitive to the shape of the prior distribution over the parameter space of H_1 . As the distribution is made more and more diffuse, the number of observations required to reject H_0 becomes larger and larger. This is known as Lindley's paradox. As a consequence, Bayesian statisticians characteristically assert that no meaningful hypothesis test of this kind is possible unless the prior probability distribution of θ under H_1 is informative. Non-Bayesians tend to find the assertion counter-intuitive and the sensitivity unacceptable.

Aitkin (JRSS B, 1991) tried to resolve the paradox by using what he called "Posterior Bayes Factors," which were almost insensitive to the amount of information supplied by the prior on θ . Aitkin described his attempt as a "Bayes - non-Bayes compromise." None of the orthodox Bayesians who contributed to the discussion (in JRSS) regarded it as a successful one, however, because it violated Bayesian principles.

It will be shown that a close relative to Aitkin's Posterior Bayes Factor can, indeed, play a central role in a genuinely Bayesian analysis and that the corresponding test results are in harmony with those obtainable from a typical non-Bayesian analysis.

Announcements (cont'd)

Other Up-coming Events....

Following are a number of up-coming events which may be of interest to Chapter members:

- **June 27-30, 1993**, the International Conference on Establishment Surveys will be held in Buffalo, NY. The theme is Survey Methods for Businesses, Farms and Institutions. Remaining registrations are very limited. For information contact Lee Decker, American Statistical Association, 1429 Duke Street, Alexandria, VA 22314-3402; phone: (703) 684-1221; FAX: (703) 684-2036.
- **June 28-July 23, 1993**, the Joint University of Maryland-University of Michigan Program in Survey Methodology will hold a month-long short course on Survey Errors and Survey Costs. This offering is the first to be made in collaboration with the Michigan Summer Institute in Survey Research Techniques, Ann Arbor, MI. The course, taught by Bob Groves, will be held at the University of Maryland, College Park campus, Mondays - Fridays, 3-5 PM. For more information, contact the Joint University of Maryland - University of Michigan Program in Survey Methodology, University of Maryland, 1218 Lefrak Hall, College Park, MD 20742; phone: (301) 314-7911; FAX: (301) 314-7912; Internet: JPSM@SURVEY.UMD.EDU.
- **August 8-12, 1993**, the Joint Statistical Meetings will be held in San Francisco, CA. For information on the program and registration, contact Meetings Dept., American Statistical Association, 1429 Duke Street, Alexandria, VA 22314-3402; phone: (703) 684-1221; FAX: (703) 684-2036.
- **September 14-15, 1993**, the Joint University of Maryland-University of Michigan Program in Survey Methodology will sponsor a short course on Variance Estimation for Sample Surveys. Keith Rust and Michael Brick of Westat, Inc. will be the speakers. Techniques, including Linearization, the Jackknife, and Balanced Repeated Replication, will be reviewed, and practical applications will be emphasized. For more information, telephone the Joint Program Short Course Office, at (1-800) 937-9320; FAX: (313) 764-8263; or e-mail: JPSM@UM.CC.UMICH.EDU.

Tentative Schedule of SIGSTAT Meetings

SIGSTAT is the Joint Special Interest Group in Statistics for the Capital PC User Group and WORMSC (Washington Operations Research/Management Science Council). The tentative schedule of events for June is as follows:

- 6/09/93: PS-Plot.**--PS-Plot is a technical plotting and data processing program running under DOS with a GUI interface. It has a spreadsheet-like data sheet for data editing and analysis, file import facilities, simple statistical analysis procedures, FFT and smoothing, and extensive 2D and 3D plotting options.

All meetings are scheduled for Wednesdays from 12:30 - 1:30 PM in Room B-14, 1301 New York Ave., NW, Washington, DC. (The building is located midway between the Metro Center and McPherson Square Metro stops.) If this is your first SIGSTAT meeting, call Charlie Hallahan, (202) 219-0507, to gain entry into the building.

EDITORS' NOTE

This is our last issue of the *WSS NEWS*. The job has been quite fun, but it's time to move on, and let someone else take over.

We would like to take this opportunity to thank all of those people who have helped us over the past two years -- program chairs, WSS officers, QL volunteers and other readers. We appreciate all of your submissions -- large and small, timely (or not).

In particular, we want to express our sincerest gratitude to **Laurie Logan, of Logan Press**, for all her patience with us when we sent the newsletter to her late and for the extraordinary efforts she must have gone to to ensure that it still got out on time. We couldn't have done the job as well without her!

This issue of the *WSS NEWS* marks the end of the 1993 program year. The next issue of the *NEWS* will appear in September. Items for that issue must be submitted by no later than **Tuesday, July 27, 1993**. Fax items to:

Michael L. Cohen
Fax: (202) 254-9700

Employment Column

As a service to local statisticians, the **Washington Statistical Society News** provides notification of employment opportunities and description of those seeking employment here in the Washington, DC, area. Readers are encouraged to take advantage of this feature of the newsletter. The deadline for inserting notices is five (5) weeks before the publication date. Those interested should write to: Bill Arends, USDA-NASS, Room 4133 South Building, Washington, DC 20250-2000. Contact Mr. Arends at (202) 720-6812.

Vacancies

Mathematical/Health Statisticians

The Statistics Branch of the Center for Devices and Radiological Health (CDRH) of the Food and

Drug Administration (FDA) has immediate openings for full-time mathematical (GS-1529) or health (GS-1530) statisticians, to provide statistical support for the regulatory and research activities of CDRH. These positions are at the GS-11/12/13 levels, depending on qualifications and experience. They are also open to qualified Commissioned Officers in the U.S. Public Health Service. Responsibilities include: evaluating manufacturer's analyses of clinical trials, submitted to establish safety and effectiveness of new medical devices; providing risk assessments of medical device or radiation health hazards; and collaborating with scientists and engineers on research projects. Interested applicants should contact: Harry F. Bushar, Ph.D., Chief, Statistics Branch, CDRH, FDA, Suite 405, 1801 Rockville Pike, Rockville, MD 20852; or call (301) 227-8620; Fax: (301) 227-8050 for additional information. EOE

Employment Column (cont'd)

Vacancies (cont'd)

Computer Statistical Programmer

Science Applications International Corporation. Environmental and Health Sciences Group in Falls Church, VA is recruiting a senior statistical programmer with at least 6 years experience managing and performing data base management, programming, and graphics.

Applicants should have an MS degree in Computer Science, Statistics, or a related field, and technical skills and experience in the following areas: SAS, IBM/MVS Environments, MS-DOS, MS-Windows, Novell Netware, PC hardware maintenance and trouble shooting.

This position offers a competitive salary and an excellent benefits package, including stock ownership and retirement programs. Qualified individuals should forward your resume with salary history to: SAIC, 7600 A Leesburg Pike, Falls Church, VA 22043, Attn.: Harold Lester. EOE

Job Applicant

Listed below is a brief description of the qualifications of an applicant seeking employment. Employers interested in interviewing an applicant should contact Bill Arends by mail -- at USDA NASS, Room 4133 South Building, Washington, DC 20250-2000 -- or by telephone -- at (202) 720-6812. All requests should include the code number from the applicant's ad and employer's name, organization, and telephone number. The applicant will be notified of the employer's interest and initiation of any further contact will be left to the applicant. All contacts will be kept confidential.

Applicant #93-04

Experience:

Applied mathematician with a background in mathematical statistics and operations research. Strong ability to conceptualize problems and communicate mathematical techniques to non-technical management or professionals. Nine years experience with various applications in economic forecasting, resource allocation, quality assurance/reliability, and inferential statistics. Analyses performed with SAS on both mainframe and micro-computer environments.

Education:

B.A. in Mathematical Statistics; pursuing M.S. in Operations Research.

Obituary

Dana Mills Barbour

Dana Mills Barbour, a retired statistician at the Office of Management and Budget (OMB), died May 1, of a pulmonary embolism. He was 85 years old.

Barbour came to Washington, DC after serving in the military in World War II. He joined what was then called the Bureau of the Budget, and worked in the Statistical Policy Office, where he was an authority on forms clearance for non-statistical agencies, rising to become Statistical Projects Clearance Officer. Except for a brief sojourn at The Brookings Institution in the 1950s, Barbour remained at OMB until 1973, when he retired. He later went on to consult with the National Paperwork Commission. Barbour was a WSS member and an elected Fellow of the American Statistical Association. His wife of 35 years, Genevieve Q. Barbour, survives him.

SCIENCE FAIR WINNERS 1993

The Washington Statistical Society presented awards to 43 Washington-area students at five regional science fairs this spring. Since 1986, WSS has been making these awards to students whose projects demonstrated excellence in the investigation or application of statistical methods to a particular scientific problem. This year, first award winners received a book -- *Statistics: A Guide to the Unknown*, by Tanur et al., or *The Fascination of Statistics*, by Brook, et al. Others received certificates of honorable mention.

Thanks to all of those who volunteered as judges! They are: Lee Abramson, Eugene Burns, Christine Carter, Bob Clickner, Paul Cook, Brenda Edwards, Teri Gardenier, Tom Harahush, Ellen Hertz, Gene Heyman, John Irvine, David Kao, Jim Knaub, Cecilia McWhirter, John Rogers, Sid Schwartz, Stuart Scott, Roger Smith, Michael Stoto, Brian Taylor, Leslie Wallace, Dan Weinberg, and Glenn White.

Awardees and their schools and project titles are listed below.

Alexandria - Arlington - Falls Church

First Awards:

Ruby Afram, 9th grade, Washington-Lee High School — "The Effects of Lower Body Flexibility on Leg Strength"

Alexander N. Pyke, 7th grade, Williamsburg Intermediate School — "Use of a Neural Network to Predict High and Low Daily Temperatures"

Honorable Mention:

Matthew Carter, 11th grade, H. B. Woodlawn High School — "Random Walks in Fractional Dimensionalities"

Laura Flynn, 12th grade, Yorktown High School — "The Effect of Phosphate and Nitrate on the Growth of Green Algae, Chlorella"

Brian M. Green, 9th grade, Yorktown High School — "Green Gold from Leaf Mold: A pH Time and Temperature Study"

Jeffrey Hadden, 9th grade, Yorktown High School — "The 'Lefty-Righty Percentage': Myth or Reality"

Matthew Munsey, 11th grade, Wakefield High School — "Chaotic Patterns in the Game of Life: Orderly"

Katherine R. Saul, 9th grade, Yorktown High School — "The Effect of Gender on a Teenager's Perceptions of Bodily Dimensions"

Anthony Shulsky, 10th grade, Wakefield High School — "What is the Effect of Green Tea, Black Tea, Coffee, and Water on the Growth of Facial Bacteria"

District of Columbia

First Awards:

Cedar Riener, 11th grade, Wilson High School — "Sexual Dimorphism in the Human Cranium"

Geoffrey A. Evans, 9th grade, Gonzaga High School — "Effects of Chemical vs. Organic Fertilizers on Rye Grass"

Honorable Mention:

Alex Acree, 7th grade, Holy Trinity — "The Stress of Sports"

SCIENCE FAIR WINNERS 1993 (cont'd)

District of Columbia (cont'd)

Honorable Mention (cont'd):

Jackson Norton, 8th grade, Stuart Hobson —
“Driven to Distraction”

Sanjaya Hettihewa, 12th grade, Wilson High School — “Lost in School”

Evan Major, 8th grade, Sheridan — “Probability”

Robert Leard, 9th grade, Gonzaga High School — “Weather or Not”

Fairfax County

First Awards (Senior Division):

Ari Bixhorn, 12th grade, Edison High School — “Use of Principle Component Analysis to Determine Socio-Economic Status”

Luan Vuong, 9th grade, Marshall High School — “Endangered Genes?”

Honorable Mention (Senior Division):

Tanya Achmetov, 9th grade, McLean High School — “Neutralizing Agents (Properties) of Soil on Acidic Water”

Neil Malhotra, 12th grade, Oakton High School — “Radiative Powers”

Amanda McDermott, 11th grade, Fairfax High School — “A Statistical Analysis of Weather Trends”

Michael Montemerlo, 12th grade, Thomas Jefferson High School — “Application of Ge-

netic Algorithms and Bayesian Inference to Data Classification”

Rachel Parkin, 10th grade, Annandale High School — “What Type of Wind Breaker Fence Works the Best”

Sara Zimmerman, 11th grade, Langley High School — “Environmental Changes Caused by Nuclear Testing at the Nevada Test Site”

Prince Georges County

First Awards (Senior Division):

Sean Fox, 11th grade, Calvert High School — “The Study of Gene Linkage in Soybean”

Honorable Mention (Senior Division):

Benjamin Mizukawa, 12th grade, Oxon Hill High School — “Insect Control of Lythrum Salicaria

Jennifer Unsell, 12th grade, Eleanor Roosevelt High School — “Gender Role Stereotyping in Children”

Joseph Lembo, 12th grade, Oxon Hill High School — “Bridging the Gap”

Stephen Granite, 12th grade, Eleanor Roosevelt High School — “Bacteria in Local Grocery Store Meat”

Haowei Zhang, 12th grade, DuVal High School — “An Ion-Exchange System”

First Awards (Junior Division):

David Fontaine, 8th grade, Kenmoor Middle School — “Watching the Moon”

SCIENCE FAIR WINNERS 1993 (cont'd)

Prince Georges County (cont'd)

Honorable Mention (Junior Division):

Steven Kindrock, 8th grade, Eisenhower Middle School — “They Can’t Pick Them”

Andrew Mann, 8th grade, Northern Middle School — “Trickle Down Mathematics”

Montgomery County

First Awards:

Tony Irish and Gary Young, 7th grade, Takoma Park Middle School — “A Test for the Best Bubble Solution”

Jonathan Schlaifer, 8th grade, Eastern Middle School — “Roulette: A Statistical Analysis”

Honorable Mention:

Ethan Baker and Bradley Renuart, 7th grade, Takoma Park Middle School — “Successful Baseball”

Rachel DeBarros, 9th grade, Walt Whitman High School — “The Confused Digger Wasp”

Helen Ding, 12th grade, Albert Einstein High School — “An Animal Model of OCD”

Michael Douma, 12th grade, Montgomery Blair Magnet School — “Effects of pH and Voltage on Alpha-toxin Ion Channel”

Connie Piccone, 9th grade, Connelly School of the Holy Child — “Effects of Pollutants on Arena Sativa”

Jason Williams, 10th grade, Montgomery Blair Magnet School — “Hash Sorts of Unevenly Distributed Data Sets”

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