This symposium will showcase the work of mathematicians, computer scientists, architects, and biologists who mutually work in both art and their respective disciplines. The art objects generated by these artists/scientists range from the molecular level of nanostructures of DNA to organismal representations of a variety of biological organisms, such as radiolaria echinoderms and trees, to abstract entities such as strange attractors and chaos. How is art fundamental to not only the visualization of scientific and mathematical concepts but to the very understanding of these concepts by scientists and mathematicians in the first place? Alternatively, how are science and mathematics sources of conceptual art? Furthermore, to what degree does aesthetics foster the imagination of students and their potential to do innovative scientific and mathematical work and help them to better communicate their ideas to a wider public?

Organizer: John R. Jungck, Beloit College
Moderator: Tim Gerber, University of Wisconsin
Speakers:

**Maura Flannery**, St. John's University  
The Herbarium as Muse: Plant Specimens as Inspiration

**Robert J. Krawczyk**, Illinois Institute of Technology  
Dimension of Time in Strange Attractors

**Jo Ellis-Monaghan**, Saint Michael's College  
The Shapes of Sea Shells: Mathematical Beauty in the Natural World

**George W. Hart**, Independent Sculptor  
Sand Dollars, Echinodermata, and Radiolaria: Sculptural Forms from Hyperbolic Tessella

**John R. Jungck**, Beloit College  
Fostering Figuring and Fascination: Engagement in Aesthetic Appreciation of Science
standard 180-minute format (4-6 speakers including moderator) All speakers and the moderator are confirmed although one speaker’s commitment is funding dependent.

Speakers:

(1) The Herbarium as Muse: Plant Specimens as Inspiration

An herbarium is a collection of preserved plant specimens, the majority of which are dried pressed plants attached to sheets of paper, though fruits, pollen, seeds, mosses, lichen are stored in other ways. All these specimens are important to plant taxonomists, ecologists, and others who need the information such collections possess. Herbaria are becoming more valuable because their specimens are often old enough to aid in documenting climate change and environmental degradation. In addition, as the information on the sheets is digitized and made more widely available, the significance of these collections is becoming better known not only to scientists but to artists. Some herbarium specimens are indeed works of art, that is, the type specimen, upon which the description of a species is based, is sometimes not a dried plant, but a drawing or painting of the plant. The plants themselves are often beautifully arranged on sheets and have aesthetic as well as scientific value. Finally, a number of contemporary artists are using herbarium collections as sources of inspiration for their work. These include the oil paintings of Victoria Crowe, the watercolors of Rachel Pedder-Smith, the colored SEM scans and ceramics of Rob Kesseler, the seed drawings of Sophie Munns, and the installation art of James Walsh. In addition, the German artists Joseph Beuys and Anselm Kiefer have used dried plants in their work, while Paul Klee created an herbarium as a source of images for his art. This presentation will explore the interaction between art and science that takes place in this work and will argue that beauty and utility meet intimately in the herbarium.

Maura C. Flannery, AAAS Fellow, History and Philosophy of Science Section; Professor of Biology and Director of the Center for Teaching and Learning, St. Johns University, 268 Bent Hall, 8000 Utopia Parkway, Jamaica, NY 11439; and, Department Editor, Biology Today, The American Biology Teacher. Phone: 718-990-1860; Fax: 718-990-2097; E-mail: flannerm@stjohns.edu

(2) BitArtWorks: Dimension of Time in Strange Attractors
(http://www.bitartworks.com/chaos/index.htm and
<http://www.bitartworks.com/chaos/index.htm>)

“Structured, unstructured; visible, invisible; logical, illogical; perfect, imperfect; intentional, unintentional; two-dimensional, three-dimensional. An unpredictable assembly of scattered points congregates into perceptual patterns. Our visual perception overrides any logical order we wish to establish. Color causes the crossover of dimension. Many of these could have been inspired from natural forces such as, wind and water, or earthen formations. For example, the stone series explores the possible subsurface patterns in nature that are not visible to us; the smoldering images smoke, others; folding, bending, twisting, draping and crumpling of identifiable materials or organisms.”

Robert Krawczyk, Associate Dean of Undergraduate Academic Affairs and Associate Professor, College of Architecture, Illinois Institute of Technology, 3360 South State Street, Chicago, IL 60616
Phone: 312.567.5708
Email: krawczyk@iit.edu

“Professor Krawczyk's teaching and research focuses on digital craftsmanship. His work covers digital methods and artwork integrating science, mathematics, architecture, and technology. Krawczyk's artwork includes prints, web pieces, sculptural, and architectural studies. His main interest is in exploring the variety of interesting design opportunities that occur when nature, chaos, order, mathematics, and form are all interrelated and contrasted, using a wide range of digital technologies to conceive as well as produce his work.”


“As a sculptor, I am interested in creating physical objects that are novel, natural, strongly self-coherent, and convey a sense of “structural inevitability.” In my work, I use a variety of mathematical ideas and physical materials [4]. The motivation for the designs presented below is to realize visions for structures that are similar to forms in the echinoderm family, but happen not to exist in nature. The algorithms are used to produce boundary representations that are physically realized via solid freeform fabrication techniques. Accordingly, the generating algorithms must be robust enough to produce “watertight” triangulated boundary representations consisting of one connected manifold.”
George W. Hart, Dept. Computer Science, State University of New York at Stony Brook, Stony Brook, NY 11794 USA  
Email: george@georgehart.com

“As a sculptor of constructive geometric forms, my work deals with patterns and relationships derived from classical ideals of balance and symmetry. Mathematical yet organic, these abstract forms invite the viewer to partake of the geometric aesthetic. I use a variety of media, including paper, wood, plastic, metal, and assemblages of common household objects.

Classical forms are pushed in new directions, so viewers can take pleasure in their Platonic beauty yet recognize how they are updated for our complex high-tech times. I share with many artists the idea that a pure form is a worthy object, and select for each piece the materials that best carry that form. In one series of pieces, familiar objects are arranged in engaging configurations, displaying an essential tension between mundane individual components and the strikingly original totality.

Because my works invite contemplation, slowly revealing their content, some viewers see them as meditation objects. A lively dancing energy moves within each piece and flows out to the viewer. The integral wholeness of each self-contained sculpture presents a crystalline purity, a conundrum of complexity, and a stark simplicity.”

(4) DNA Nanostructures, Virtual Seashells, Crocheted Hyperbolic Corals  
(More technical related talk: < http://academics.smcvt.edu/jellis-monaghan/Talks/NIMBIOS%20nanostructure%20design%20strategies.pdf> )

Jo Ellis-Monaghan, Professor, Department of Mathematics, Saint Michael’s College, Winooski Park, Colchester, VT 05439  
Phone: 802 654 2660  
Fax: 802 654 2610  
E-mail: jellis-monaghan@smcvt.edu

Professor Ellis-Monaghan is an applied combinatorialist who works on graph theoretical design strategies for self-assembling DNA structures such as those that have been featured in recent years in Scientific American, Discover, Science Illustrated, etc. Her work in with nanotechnology models is also coupled with an interest, stemming from her fine arts background, in modeling the graceful morphology of mollusks such as snails and bivalves. She is also the Editor-in-Chief of PRIMUS, a journal dedicated to all aspects of mathematics pedagogy.

(5) Fostering Figuring and Fascination: Engagement in Aesthetic Appreciation of Biological Patterns
John R. Jungck, AAAS Fellow Education; Vice President, International Union of the Biological Sciences; and, Mead Chair of the Sciences, Beloit College, 700 College Street, Beloit, WI 53511  
Phone: 608-363-2012  
Fax: 608-363-2052  
E-mail: Jungck@beloit.edu

What do forest canopies, reticulated giraffes, fish boundaries on sandy lake bottoms, dragonfly wing venation, cross-sections of leaves, fiddler crab flocking behavior, epithelial cell boundaries, drug design, packing of side chains in proteins, bird territories, spider webs, stony coral colonies, and amoeba that live in glass houses share in common? Do biological systems construct more complicated tessellations than M. Escher's fantastic puzzles of fish, birds, butterflies, shells, and reptiles? Why? How does mathematics help us both appreciate aesthetic alternatives to symmetry in nature and to better understand the behavior of biological systems? How is this useful to medical imaging for prognosis and diagnosis of various cancers?

Professor Jungck has presented mixtures of art, biology, mathematics, and education at the Seralves Museum in Porto, Portugal as well as around the world in numerous countries: Thailand, New Zealand, Brazil, Chile, China, Ukraine, France, Germany, South Africa, Canada, Mexico, ... He has developed such software as 3D FractaL Tree that allows students to build realistic three dimensional computer models of trees from just a few measures on actual trees. He maintains an “Art Gallery of Mathematical Biology” developed by his students over 33 years.

(6) Moderator: Professor Tim Gerber, Department of Biology, University of Wisconsin-La Crosse, Email: dgerber@uwlnax.edu; Phone: 608-785-6977
Instructions for Submitting Symposium Proposals

The deadline for proposal submission is Thursday, 26 April 2012, 11:59 p.m. PT. Proposals will not be accepted after the deadline. All proposals will be peer-reviewed. Decisions will be announced in July. To receive notifications, please ensure that the following e-mail addresses will not be blocked: meetings@aaas.org, cjones@aaas.org, nmaylett@aaas.org, and brice@aaas.org.

Follow these instructions carefully. The information you provide will be used by the reviewers to evaluate and score your proposal. Incomplete proposals will be eliminated from consideration.

For additional guidance, the Program Committee underscores the fact that a successful symposium proposal is characterized by interesting and timely topics that are thoughtfully developed and include capable and articulate speakers who represent the diversity of science and society, including disciplinary field, gender, ethnicity, and geographic location.

SCHEDULING NOTE: When selecting speakers, please ensure that they are available to participate at any time from Friday, 15 February through the morning of Monday, 18 February 2013. Once the schedule for sessions is announced in the fall of 2012, it will be considered final.

LANGUAGE AND STYLE: Meeting attendees come from more than 50 countries. For language choice, use American English spelling and translations. For style, use The Chicago Manual of Style. For example, use a comma before "and" in a series of three or more, and spell out all abbreviations and acronyms. Do not use "ALL CAPS" for the title of a symposium or the title of a speaker presentation. A correct example:

Rethinking the Science, Biology, and Importance of Stem Cells in Regenerative Medicine

AAAS reserves the right to edit all submissions for publication.

TRAVEL SUPPORT: Organizers, speakers, and others participate in the program at their own expense or use funding secured by an organizer from a source that has been vetted by AAAS Meetings to avoid conflicts of interest. As a nonprofit organization, AAAS does not have the financial resources to fund travel expenses for the more than 1,000 program participants at each year’s meeting. However, one of the 24 disciplinary sections of AAAS may choose to authorize travel support for speakers, organizers, and discussants from their modest
budgets. Funding is limited and typically provides partial support. Co-organizers and moderators are not eligible to apply for travel support unless they are acting as a moderator in place of an organizer who cannot attend the meeting.

FOUR STEPS FOR SUBMISSION

1. Set up Proposal

TITLE OF PROPOSED SYMPOSIUM

Title must include no more than 85 characters, including spaces. When preparing a proposal and the title of the symposium, organizers are encouraged to be creative and to focus on the interdisciplinary nature of the AAAS Annual Meeting. Please avoid jargon.

SUBMITTER E-MAIL ADDRESS

Please enter a valid e-mail address where messages can be received and accessed year long. The submitter will immediately receive an e-mail confirming the initiation of a special session proposal.

SESSION TYPE

Specify the total time requested for your symposium. Keep in mind that speakers may travel far and have busy schedules; allow them enough time to make substantive presentations and to take questions from the audience.

There are three session types: 90-minute format; standard 180-minute format; and alternate 180-minute format.

The Program Committee reserves the right to accept a proposal contingent on altering the time requested. 90-Minute Format: See Section 2.

Standard 180-Minute Format: See Section 2.

Alternate 180-Minute Format: You must enter 4 speakers only and 1 moderator, who also can be an organizer, and allow a minimum of 1 hour for interaction with attendees in a breakout session format.

During the interactive part, the moderator and speakers can serve as facilitators. The room will be set with a mix of theater and round-table seating.

180-MINUTE TIME JUSTIFICATION
Proposals for 180-minute symposia must present compelling reasons as to why the additional time is needed.

CATEGORY SELECTIONS

Please select the Primary Subject Category that best describes the overall nature of the symposium. This information is used by the Program Committee to help generate broader symposium tracks or sub-themes.

Please select Secondary Subject Categories within which the symposium falls. This information is used to develop the cross-cutting General Subject Index contained in the Program Book.

SECTION MEMBER AFFILIATION

If applicable, indicate the primary section affiliation of the session organizer.

DISCIPLINARY SECTIONS CONSULTED? (optional)

Indicate if your proposal has been discussed with an AAAS Section. Consultation is not required, however, sections can provide input to help strengthen a proposal, especially if an organizer is submitting for the first time.

Consultation does not imply support or endorsement of a proposal. A list of sections and contacts are available at http://www.aaas.org/aboutaaas/organization/sections/.

SYNOPSIS

Provide a clear, succinct synopsis of your proposed symposium (up to 1,500 characters, including spaces) as it would appear in the Program Book. Avoid the use of report or book references, abbreviations, or technical jargon. Do not repeat the meeting’s theme title in a symposium title or synopsis. Annual Meeting programs are archived at www.aaas.org/meetings and can be a useful source of information.

Describe the subject, highlighting the scientific issues, innovations, or research to be addressed. Do not name or reference speakers or the titles of their presentations in the synopsis. Speakers are listed separately along with their presentation titles and descriptions (see Step 2).

RELEVANCE TO THEME OR SPECIAL RELEVANCE TO THE AUDIENCE

Describe how the proposed symposium relates to the theme (up to 500 characters, including spaces). Almost any topic in science and technology can be related to the
theme, and submitters are encouraged to extend their reach by thinking internationally. However, the Committee will consider proposals that are not directly related to the theme if they involve ground-breaking areas of research, new and exciting developments, or cross-cutting activities in support of science, technology, and education.

2. Add/Edit People

EXPLANATION OF ROLES

Please note: If the organizer or co-organizer will also be participating in the session, each separate role must be entered into the system (e.g., organizer and moderator).

Symposium Organizer

A symposium may only have one organizer. The organizer serves as the primary contact for all communications with AAAS Meetings. It is the responsibility of the organizer to submit the proposal to AAAS and ensure that participants, including the co-organizer(s), receive all information relevant to their inclusion in the proposal and in the Meeting if the proposal is accepted.

Speakers

A 90-minute symposium is limited to no more or less than three (3) speakers, a standard 180-minute symposium is limited to a minimum of four (4) and a maximum of six (6) speakers, and an alternate 180-Minute symposium must have four (4) speakers only and one (1) moderator, who also can be an organizer. Allow speakers enough time to make substantive presentations and to take questions from the audience. If your symposium addresses a subject for which there are differing scientific opinions, include speakers with different perspectives. Speakers must not all be from the same institution.

Optional Roles

Symposium Co-Organizer (optional)

Co-organizers assist the organizer with lining up speakers and ensuring that deadlines are met by symposium participants. There is a maximum of two (2) co-organizers.

Moderator (optional)

A maximum of one (1). This role is filled by the symposium organizer or co-organizer unless one of them cannot attend the meeting. The moderator provides a brief overview, introduces each speaker, and facilitates a general discussion by the
audience and speakers through a Q&A session. Moderators do not make presentations, submit abstracts, or have a formal speaking role.

Discussant (optional)

A maximum of one (1) discussant for a 90-minute session and two (2) for a 180-minute standard format session.

Discussants provide a brief review of, or counterpoint to, the main topics or issues covered by the panel. They do not make presentations, submit abstracts, or have a formal speaking role. There are no discussants in the 180-minute alternate format; the moderator and speakers serve as facilitators.

PARTICIPANT INFORMATION

You will be required to enter the following information for each individual:

Name (confirm correct spelling)

Affiliation (primary institution; confirm correct spelling)

E-mail address (confirm address where messages can be received year long)

City

State or Province (if applicable)

Country

Status (confirmed or invited)

Complete mailing address

Fax number

Telephone number

Without correct contact information, AAAS will be unable to:

Confirm participation.

Communicate with speakers who apply for travel assistance.

Send information to speakers about Newsroom Operations, including invitations to participate in news briefings and interviews.
For each speaker include a firm presentation title (up to 85 characters, including spaces); for example, Domains of Learning and Memory that Are Enhanced with Sleep in Adults. Also, describe the proposed content or perspective of the presentation in a few sentences (up to 500 characters, including spaces). This is crucial to the reviewers’ understanding of why you are proposing a particular speaker.

Please do not submit CVs, provide biographical information, or submit abstracts. A request to submit an abstract will be made AFTER the Program Committee has made its program selections. While recognizing that some changes will occur, the committee reserves the right to reconsider symposia if speaker substitutions after acceptance shift in symposium’s focus away from the original proposal’s.

Status: Invited or Confirmed. Invited means that you have contacted the speaker, and your invitation is under consideration. Confirmed means that the speaker has responded to your invitation and confirmed that he or she is both available over the dates of the meeting and will participate if the proposal is accepted. After the program is final, AAAS will send notifications to all panelists, whether invited or confirmed, to verify their status and request final confirmation.

3. Enter Keywords

Select up to five (5) keywords that best describe your proposal. Select up to five (5) keywords that best describe your proposal.

4. Confirmation

Once you have entered all the required information for the people in your session (including a presentation Description for each speaker), proceed to the Confirmation step. Review all the information you have submitted. If you need to make corrections to any information, just click on the appropriate step link in the left frame.

Otherwise, click the "Submit" button at the bottom of the page. To log out, simply close your browser window. If you run into any problems, please e-mail your questions or comments using the hyperlink to Technical Support that appears in the Symposium Control Panel.

5. Review

The following are the scoring considerations used by reviewers. Organizers should carefully follow the instructions for submitting their proposals, which will be scored for completeness and clarity. Incomplete proposals will not enter review.
1. Evaluate the proposal in general: Is information adequate for evaluation? Does the proposal clearly describe the session? Is it well organized and coherent? More important, is the proposal complete?

2. Evaluate the topic: Is the topic timely? Is it suitable for an AAAS Annual Meeting? Is the topic too narrow for a multidisciplinary audience? The AAAS Annual Meeting Scientific Program Committee is particularly interested in proposals that highlight the theme. However, proposals that are not directly related to the theme will be considered if they involve ground-breaking areas of research, new and exciting developments, or cross-cutting activities in support of science, technology, and education.

3. Evaluate the content: Does the proposal cover ground-breaking areas of research, new and exciting developments, or cross-cutting activities in support of science, technology, or education? Does it present new or innovative ideas to attendees? Is it a policy-related proposal that presents the science underlying policy or addresses issues of significant importance to research, funding, or collaboration? Consider overall merit and the importance of including the proposed session in the program as well as whether the content is too specialized for an AAAS multidisciplinary audience.

4. Evaluate the participants: Are they of a caliber to speak authoritatively on their topic? Is the panel composed of diverse organizations and institutions? Are the presentations integrated and coherent as a group? Does the panel present a balanced perspective?

5. Finally, and most important, we want you to make an overall judgment as to the relative merit of each proposal, expressed as a rank ordering of all the proposals that you review, with 1 the best, 2 the second best, and so on. This rank should be based on the previous four criteria, but it need not be from a mechanical arithmetic average of your communicated scores. Different criteria may figure more or less strongly in your judgment of each proposal, based on the particular nature of that proposal, and this can be reflected in your overall rankings.