



IGB NEWS

Achievements, awards, and information about the IGB community

Volume 6, Number 4



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Upcoming Events



IGB BBQ
June 14, 2013
12:00 p.m.—
1:00 p.m.
IGB Concourse

Join us rain or shine for the IGB BBQ. Tickets are required and can be picked up at the IGB reception desk from June 3-7.

Pioneers in Genomic Biology Lecture Series (BCXT)

August 27, 2013
12:00 p.m.

612 Institute for Genomic Biology

Roy Kishony, PhD
*Professor, Harvard Medical School,
Department of Systems Biology
Harvard University*

"Title to be announced"



Pollen Power!

**A summer day camp
for middle school girls
July 8 through 12, 2013
9:00 a.m. to 5:00 p.m.
Institute for Genomic Biology**

The IGB is hosting a week long day camp for middle school age girls with an interest in plants and the environment.

More info and registration available at
<http://pollensummercamp.illinois.edu/>

IGB Seminar (GNDP)

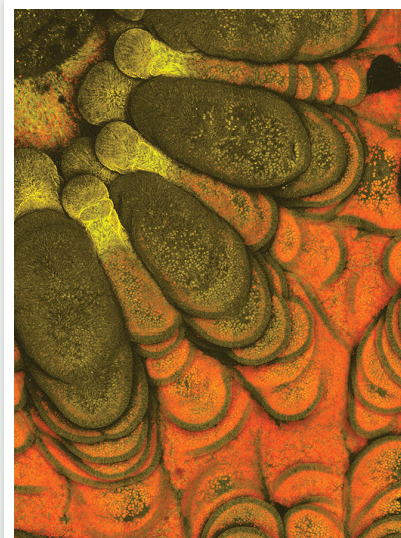
September 10, 2013
12:00 p.m.

612 Institute for Genomic Biology

Michael Schatz, PhD
*Assistant Professor, Simons Center
for Quantitative Biology
Cold Spring Harbor Laboratory*

"Title to be announced"

Image of the Month



This month's image, "Polyp from the reef building coral *Montastraea faveolata* on Curaçao, southern Caribbean" is provided by Carly Hill Miller, Mayandi Sivaguru, Glenn Fried and Bruce Fouke of the Fouke lab, taken with the Zeiss LSM 710 two photon microscope. The lab is analyzing how corals co-evolved with algae to optimize the harvesting of light from seawater.

IGB News

Share your news with the IGB. Send your story ideas to nvasi@illinois.edu

University of Illinois Professor Elected Fellow of the Royal Society

University of Illinois Gutsell Endowed Professor of Crop Sciences and Plant Biology and Institute for Genomic Biology faculty member Stephen P. Long has been elected as a Fellow of the Royal Society of London, the world's oldest scientific academy in continuous existence. Members are elected for life on the basis of excellence in science, via a thorough peer review process.

"The Royal Society was just a few miles from where I was brought up in London," says Long. "Its fame as the meeting place of the leaders and best-known names in science, engineering and medicine was known to us at High School and throughout my career, but I could never have imagined to one day be a part of this institution. As a Londoner by birth it is a very special honor. Of course this recognition owes much to the many amazing graduate students, research fellows and academic colleagues at Essex and at Illinois who have worked with me, discussed, critiqued, supported and helped develop the ideas that have led to the discoveries recognized here."

Long has been recognized for his leadership in research on the limits to photosynthetic productivity of crops, and how these are altered by global atmospheric change. A type of photosynthesis known as C4 is recognized as being the most efficient in terms of use of light, water and nitrogen. Long was the first to discover a C4 plant in a cold climate and also discovered the most productive plant known on Earth, a C4 grass of the Amazon floodplain. He was also the first to show that *Miscanthus* (a C4 plant) was exceptionally productive, even in the relatively cool climate of England.

Upon his move to Illinois, together with his students he first demonstrated that *Miscanthus* could be exceptionally productive in the Midwest. As a result it is emerging as promising and highly sustainable bioenergy crop in Europe, and now the USA. His work also includes understanding the response of plants to rising atmospheric carbon dioxide and ozone. He led

the development of the SoyFACE facility at Illinois, the largest open-air laboratory for understanding how major crops will respond to atmospheric changes, allowing more accurate predictions of future food and feed supply.

Long has also pioneered modeling the full photosynthetic process *in silico*, providing a unique engineering framework for predicting how photosynthetic efficiency in crops may be improved; some of which have now been realized. This work culminated in a \$25M award from the Bill & Melinda Gates Foundation, led by Long, to apply this approach to rice and cassava, to raise their yield potential.

Long's academic career includes over 20 years at the University of Essex, in the Department of Biological Sciences, followed by his current appointment at the University of Illinois at Urbana-Champaign. Together with Chris Somerville and Jay Keasling of UC Berkeley, he won the interna-

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tional competition by BP Group for the Energy Biosciences Institute, a \$500M award over 10 years to provide research and development



» Gutsell Endowed Professor Stephen P. Long member of UK's National Academy of Science

primarily to realize viable second-generation biofuels. Long served as the Deputy Director during the first five years of the institute, standing down to lead the Gates Foundation multi-national project. He is currently a faculty member of the Genomic Ecology of Global Change research theme at the Institute for Genomic Biology, as well as editor-in-chief of the journals *Global Change Biology* and *Global Change Biology – Bioenergy*.

The Royal Society, founded in the 1660s, consists of distinguished members of scientific, engineering, and medical disciplines, with a fundamental purpose "to recognize, promote, and support excellence in science and to encourage the development and use of science for the benefit of humanity." Long will join other notable Fellows including Albert Einstein, Dorothy Hodgkin, Isaac Newton, Stephen Hawking, Charles Darwin, Francis Crick, and James Watson with this recognition. Only 44 new members are elected each year, from a group of over 700 candidates proposed by the existing Fellowship. ■

Researchers Work to Put Stem Cells in Their Place

Originally published online at *Chemical & Engineering News* (cen.acs.org), written by Laura Cassidy.

Hyunjoon Kong, Assistant Professor of Chemical and Biomolecular Engineering and member of the Regenerative Biology and Tissue Engineering research theme, with Chemistry Professor Steve Zimmerman and Professor and Vice President for Research Dr. Larry Schook are developing a polymer coating that could help an individual's stem cells target inflamed cells to regrow healthy tissue and calm inflammation. Their research has been published in the *Journal of the American Chemical Society*.

People with chronic diseases like diabetes and multiple sclerosis have inflamed, leaky blood vessels, heightening their risk of heart attack and stroke. Some scientists envision using a patient's own stem cells to regrow healthy tissue to plug the leaks and calm inflammation. A new polymer coating could help these stem cells find and adhere to inflamed endothelial tissue (*J. Am. Chem. Soc.*, DOI: [10.1021/ja400636d](https://doi.org/10.1021/ja400636d)).

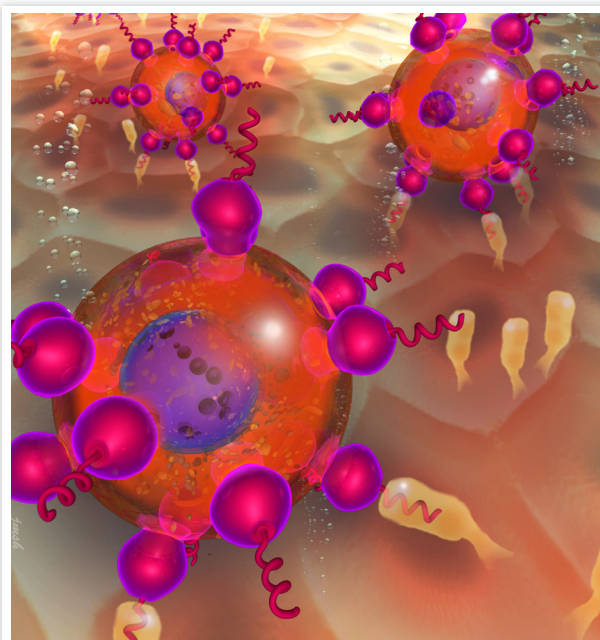
Targeting stem cells to specific tissues, such as the inner walls of inflamed blood vessels, is tricky because once injected into a person's bloodstream, the cells quickly spread throughout the body. Some researchers have tried to chemically modify the membranes of stem cells to make them stick to certain tissues. However, these complex chemical treatments are laborious and can kill the cells, says Kong. "We wanted to find a molecule that would self-assemble into the stem cell membrane and guide the cell to the target tissue," he says.

"Then, a doctor could simply mix a patient's own stem cells with our molecule and inject the mixture."

Kong and his coworkers synthesized a targeting molecule containing vasculature binding peptides, which bind to a protein that is abundant on the surfaces of inflamed blood vessels. The scientists attached these peptides to branched polyglycerol polymers that acted as a scaffold to display the homing peptides. To link the peptides to the cell, they added greasy octadecyl hydrocarbon chains to the polymers. These chains spontaneously embed into stem cells' lipid membranes.

To test the molecule's homing abilities, the scientists injected mesenchymal stem cells that they had mixed with the targeting molecule into a microfluidic device that mimicked a blood vessel. The device pumped cells over a sheet of endothelial cells that acts like inflamed tissue. The researchers counted how many stem cells adhered to the sheet. Compared with unmodified stem cells, twice as many stem cells coated with targeting molecules stuck to the cell sheet.

Kong thinks the team can improve the affinity of the targeting molecule for the inflamed tissue by tweaking the branched polyglycerol's structure



» A new targeting molecule (purple/red) could help stem cells (large red balls) adhere to the surfaces of inflamed blood vessels. The molecules coat the stem cells' membranes, presenting peptides (red helices) that then bind proteins (yellow protrusions) in the inflamed tissue. Credit: *J. Am. Chem. Soc.*

so that the peptide and hydrocarbon chain don't bump into each other.

Elliot Chaikof, a stem cell biologist at Harvard Medical School, calls the study an "elegant approach" for targeting stem cells to sites of inflammation. However, he says, the real test of the molecules' effectiveness will be animal studies.

The researchers are now testing the ability of the polymer-coated stem cells to repair ruptured blood vessels in mice, and Kong says preliminary results are encouraging. ■

IP @ IGB

What is patentable?

The intellectual property must be:

Useful

- The invention must provide benefit to the public.
- This excludes inventions that are inoperable, immoral, or contrary to public policy.
- This also excludes inventions that are ineffective or unsafe pharmaceutical compounds, as well as chemical compounds that do not have utility.

Novel

- The invention must not have been known or used in this country, patented, or published anywhere. ("Prior Art" is any information that is publicly available and relevant to the invention that exists prior to the filing date of a patent application. A "public disclosure" may be considered prior art. For more details about what constitutes a public disclosure, see IGB Newsletter Volume 5, Number 1.)
- The inventor must not have abandoned the invention.

- The inventor must be the true inventor of the intellectual property.

Non-obvious

- The subject matter of the claims in the patent must not be obvious to someone working in the field at the time the invention was made.
- This is often based on the prior art (including public disclosures). If a combination of prior art yields predictable results, the invention is most-likely obvious.

Want to know more?

Contact the Office of Technology Management: www.otm.illinois.edu. ■

Around the IGB

Awards

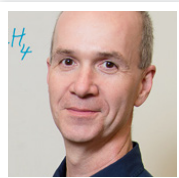
Brendan Harley



Brendan Harley was awarded a 2013 NSF Faculty Early Career Development (CAREER) Award, recognizing his efforts and leadership in the integration of educa-

tion and research. ■

William Metcalf



William Metcalf was selected by the University of Illinois as the G. William Arends Professor in Molecular and Cellular Biology. ■

Saurabh Sinha



Saurabh Sinha received the Dean's Award for Excellence in Research from the College of Engineering (formerly the Xerox Awards for Faculty Research). ■

Madhu Viswanathan



Madhu Viswanathan received a 2013 Campus Award for Excellence in Public Engagement, for faculty applying their knowledge and expertise to issues of societal

importance for the public good. ■

New Arrivals

Charles Werth



Professor Charles Werth has joined the IGB as an affiliate in the Biocomplexity Research Theme. Professor Werth is a Professor in the Department of Civil Engineering.

He joined the faculty in 1997 after receiving his Ph.D. in Environmental Engineering and Science from Stanford University. His research focuses on the transport and fate of organic chemicals in the environment, and on the development of sustainable technologies for pollution abatement. ■

Symposium

IGB Fellows Symposium



A wide variety of topics were presented at this year's annual IGB Fellows Symposium, which took place on May 2 at the IGB.

Attendees heard talks about bioenergy grasses, neurogenomic responses to social interactions, the regenerative modeling possibilities of the planarian intestine, an overview of high-performance computing, and more. The symposium brought together post-docs, graduate and undergraduate students and others to join in discussion and learn more about current issues in the life sciences.

Speakers for the symposium included Stephen Moose, Yiran Dong, Clare Rittschof, Dave Forsthoefel, Victor Jongeneel, and Pat Brown. The keynote speaker was Don Ort, Robert Emerson Professor of Plant Biology and Crop Sciences and leader of the IGB research theme Genomic Ecology of Global Change. Ort presented on the opportunities that exist to improve photosynthetic efficiency and boost crop yield, which ties into the work of a recent project funded by the Bill & Melinda Gates Foundation, of which Ort is the Associate Director of the project.

A poster session and reception concluded the day with more than 40 posters on display. The symposium is sponsored by the Institute for Genomic Biology and is organized by the IGB Fellows, who are members of the Institute's various themes. Special thanks to Fellows Melissa Cregger and Scott Woolbright, and to Jennifer Quirk, Kim Johnson, Dan Davidson, Nicholas Vasi, and Darci Edmonson. ■

Graduation

Certificate in Entrepreneurship and Management Graduation

This year saw 14 students graduate from the Certificate in Entrepreneurship and Management (CEM) program, who are now ready to help bring their research and ideas to the marketplace.

The course concluded with a Student Pitch Competition, with awards given to the top three presenters. James Doroghazi took first place, with second place awarded to Irisbel Guzman Sanchez and Nancy Shi. The third place prize was awarded to Surya Karunakaran and Angel Rivera.

The CEM program, based on the FastTrac Tech Venture program designed by the Kauffman



Foundation, included a series of lectures on technology commercialization and hands-on, experiential, learning. The course also featured numerous entrepreneurs as guest lecturers, in addition to expert instruction from course organizer and BioBEL theme leader Prof. Jay Kesan; Amara Andrews, a Kauffman certified facilitator; and BioBEL Fellow Hsiao-shan Yang.

We thank Jay, Amara, Hsiao-shan, and Liz Stull for the continued success of the CEM program. CEM is an important part of the effort of the IGB to fulfill the mission of promoting economic development in the life sciences.

For more information about the CEM program, visit www.igb.illinois.edu/cem ■

Giving



Walk of Life

Contributing to the Walk of Life is a unique opportunity to simultaneously support our mission and become a permanent part of IGB history.

Visit www.igb.illinois.edu/about/giving or contact Melissa McKillip for additional information at mmckilli@illinois.edu. ■

Around the IGB

Summer Camp

Pollen Power!

A week long day camp for talented girls who are interested in the biological sciences

Hosted by the Institute for Genomic Biology on the University of Illinois campus, Pollen Power! will provide an opportunity for girls to study plant responses to climate change in the distant past and the coming century. Research groups of 8 to 10 campers led by a female graduate student will use million dollar microscopes to image pollen, giving the campers first-hand experience in a research environment with female mentors. The camp is designed for middle school age girls with an interest in plants and the environment.

Campers will learn about the wonders and power of pollen by investigating pollen as a time capsule that can tell us about the climate from millions



of years ago, use hi-tech microscopes to identify ancient pollen and watch pollen germinate in real-time, and tour the state-of-the art research labs and facilities on campus.

Camp will be held July 8-12, 2013 from 9:00 a.m. to 5:00 p.m. The cost per camper is \$350 and scholarships are available.

Visit <http://pollensummerncamp.illinois.edu/> for more information and to register. ■

Survey

Social Committee Survey

The IGB Student Social Committee needs your input to continue to hold activities and events that build community at the IGB.

Please complete the following anonymous five minute survey. Surveys can be filled out at: <http://www.igb.illinois.edu/content/igb-social-committee-survey>

Thank you! ■

Marathon

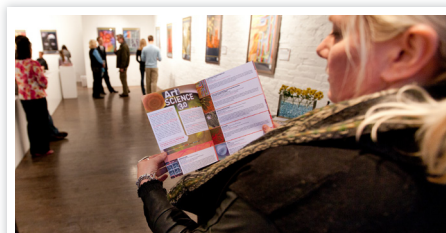
Team Photons



Members of the Genomic Ecology of Global Change research theme recently competed in the Illinois Marathon held in Champaign on April 27. Led by team captain Lisa Ainsworth (shown above, left), Photons members Katie Loverin, Steve Long, and Craig Yendrek pose with medals at Memorial Stadium after the event. The Photons took 2nd place out of 55 teams in the Co-Ed Relay category. Congratulations! ■

Exhibition

Art of Science 3.0



Now in its third year, the 'Art of Science: Images from the Institute for Genomic Biology' is an annual event that successfully spans two divides; art and science, and town and gown. Images of the

research taking place at the IGB addressing significant problems in the environment, medicine, and energy use and production were on display, drawing large crowds yet again. The state-of-the-art research instrumentation for biological microscopy and image analysis provided by the Core Facilities at the IGB provides the incredible artwork for the show, as well as providing access for faculty and students from across campus, and to scientists in Research Park. By showcasing the imagery of the Art of Science travelling art exhibit, the IGB further communicates our commitment to scientific discovery and the collaborative spirit that makes it all possible. ■

ADMINISTRATIVE NEWS

Communications

Publications

A list of recent publications is maintained on the IGB website at <http://www.igb.illinois.edu/news/publications>, but for a comprehensive list of publications a much more robust resource can be found on the IGB RefShare page, from the link at the top of that same page.

New publication info is added on a regular basis, and in order to continue to keep the database as accurate as possible, if you are an author please add your connection to the IGB in your author byline. Not only will this greatly help track potential newsworthy publications, it also increases the possibility of press coverage for the publication and for the IGB! ■

Operations & Facilities

Array Cafe

Array Cafe is happy to continue serving those of you who remain at the IGB through the summer months. Regular hours of 8:00 a.m. to 3:00 p.m. will remain in effect. While you are at the Cafe, check out the new digital signage and don't forget every Thursday they will have assorted sushi rolls available!

Bicycle Racks

A reminder to all of our building occupants to please use bicycle racks for the storage of your bicycle. Any bicycles not placed in the bicycle racks will be removed from the IGB plaza. ■

ADMINISTRATIVE NEWS

Safety

Chemical Fume Hood Safety

Always use toxic and/or volatile chemicals in a chemical fume hood, **not** on an open bench. Chemical fume hoods are designed to provide protection for the user from chemical and radiological contaminants. However, they do not absolutely eliminate exposure, even under ideal conditions. Careless work practices can result in considerable exposure to users who may believe they are protected.

To optimize the performance of the chemical hood, adhere to the following work practices:

Ensure that your chemical hood has a current inspection sticker (dated within the last year). The face velocity should be between 80 and 120 linear feet per minute (lfpm).

Verify that the chemical hood is drawing air. Check the flow monitor (if present) or use a "Kimwipe" to demonstrate flow into the hood.

Use sashes to maximize protective shielding and ventilation.

- For hoods equipped with vertical sashes, lift sashes only as far as you need to do your work comfortably, no higher than 18 inches. Sash heights higher than necessary reduce protective shielding and ventilation.
- For hoods equipped with horizontal sashes, slide the sashes to minimize the openings, keeping a panel between you and your work.

Keep chemical hood sashes closed to a six inch opening when the hood is not in use. The sash will act as a shield in the event of an unexpected release, but the opening will maintain a point of air exhaust for the lab.

Do not put your head in the hood when contaminants are being generated.

Do not heat perchloric acid in a chemical hood unless it is specifically designed

as a "Perchloric Acid Hood".

Use small tubs or shallow trays as secondary containment. This prevents incidental spills and leaks from going down the drain.

Do not evaporate or store hazardous waste for long periods of time inside the hood. Submit a request with Division of Research Safety (DRS) to pick up waste.

Perform all work and keep all apparatus at least six inches into the hood.

A chemical fume hood provides protective ventilation by means of directional airflow. Eddy currents are generated as the airflow is disrupted at the hood face. At the appropriate face velocity, eddy currents drop off about six inches inside the hood.

Route service connections under the airfoil. These include electrical cords and tubing from compressed gas cylinders. This allows unimpeded airflow into the hood.

Store chemicals and equipment outside the hood. Place chemicals in the appropriate type of cabinet (i.e. acid, flammable, or ventilated cabinets). Store unused equipment in cabinets or another location. The chemical hood is not a storage cabinet.

Do not block the slots in the hood baffle with containers or apparatus. Place equipment on blocks, jack stands or legs, so that air can flow underneath the equipment to the bottom slot of the baffle.

Replace any missing sidewall panels. If a panel is missing, the airflow inside the hood is disrupted, and the ability of the hood to contain a fire is compromised.

Locate sources of ignition or spark outside of the hood. These include transformers (Variacs), electrical outlets (such as power strips) and rheostats. ■

Business

FY14 Benefit Choice Enrollment for University of Illinois Employees

The FY14 Benefits Choice enrollment period will run from May 1, 2013 through May 31, 2013 with an effective date of July 1, 2013.

During the Benefit Choice Period this year there will be two different sessions offered to benefits-eligible employees to assist in understanding the changes. One is a campus event offered by the UPB Benefits office, and the other is offered by Central Management Services (CMS) where Benefit Fairs are scheduled throughout the state.

UPB Benefit Choice Employee Information Sessions

Information sessions are scheduled on all campuses during the month of May. These sessions will present information on health plan options, premium and coverage changes; Flexible Spending Accounts (FSA) and the changes that can be made during this Benefit Choice Period which is May 1 to May 31. To view session dates and locations please click on the following link:

<https://nessie.uihr.uillinois.edu/pdf/benefits/InformationSessions.pdf>

UPB Benefits representatives will be available to answer questions. Health plan representatives will not be present at these sessions. Registration is

required to attend these events and is available online at:

<http://apps.obfs.uillinois.edu/Registration/index.cfm?campus=5>

If additional sessions are needed, they will be added to the registration site.

CMS-sponsored Benefit Fairs

Benefit Fairs are scheduled throughout the state where health, dental, vision, life, FSA and other plan vendors will be available to answer your questions. The schedule for these events can be found at **this link**. Registration is not required.

These events are approved events under Civil Service Policy and Rules, Rule 11.12. Employees may be released from work to attend a session, University operations permitting, and subject to prior supervisor approval.

Questions?

Send an email to **benefits@uillinois.edu** or contact UPB Benefits Services at:

- Urbana 217-333-3111
- Chicago 312-996-6471
- Springfield 217-206-7144 or 217-206-7211 ■

Recent Publications

- Ruiz-Vera UM, Siebers M, Gray SB, et al. Global warming can negate the expected CO₂ stimulation in photosynthesis and productivity for soybean grown in the midwestern united states. *Plant Physiol.* 2013;162(1):410-423.
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- Branscomb E, Russell MJ. Erratum: Turnstiles and bifurcators: The disequilibrium converting engines that put metabolism on the road (biochimica et biophysica acta - bioenergetics (2013) 1827 (62-78)). *Biochim Biophys Acta Bioenerg.* 2013;1827(6):806.
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- Lamboy JA, Kim H, Dembinski H, Ha T, Komives EA. Single-molecule FRET reveals the native-state dynamics of the IκBα ankyrin repeat domain. *J Mol Biol.* 2013.
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- Yin L, Song Z, Qu Q, et al. Supramolecular self-assembled nanoparticles mediate oral delivery of therapeutic TNF-α siRNA against systemic inflammation. *Angew Chem Int Ed.* 2013.
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- Yuan Y, Eriksen DT, Zhao H. Directed evolution of a highly efficient cellobiose utilizing pathway in an industrial *saccharomyces cerevisiae* strain. *Biotechnol Bioeng.* 2013.
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- Qiu Y, Anthony E, Lohman T, Myong S. Srs2 prevents Rad51 filament formation by repetitive scrunching of DNA. *Biophys J.* 2013;104(2):75A-75A.
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