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THE NUCLEUS

February 2017 *Vol. XCV, No.6*

Monthly Meeting

2009 Nobel Laureate, Jack W. Szostak, to speak in Cambridge at Novartis

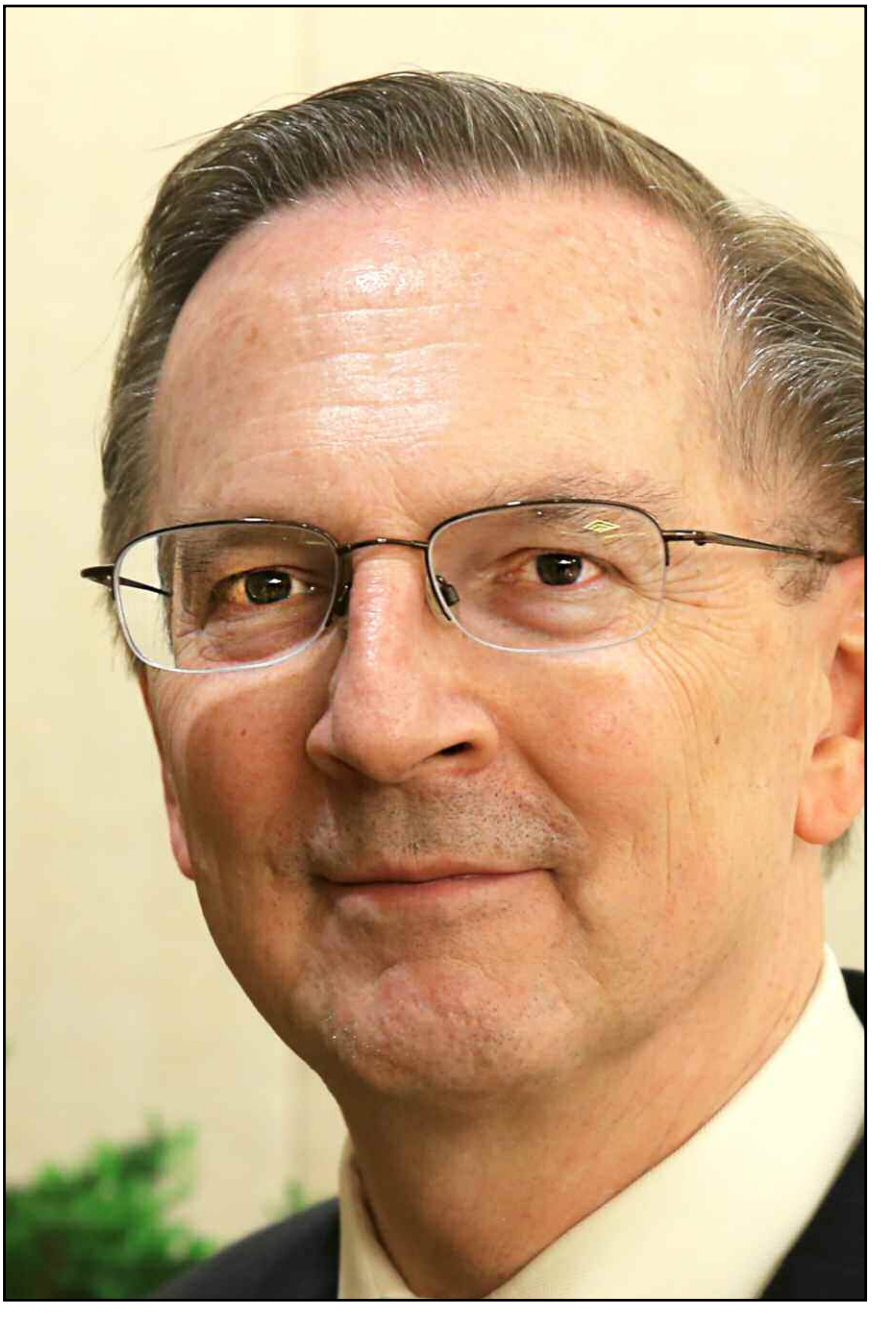
Karen Louise Piper

1938-2016

Summer Scholar Report

By Harry T. Paul, Daniel J. Wilson and Charles R. Mace

Gabor A. Somorjai to Receive 2016 Richards Medal



Karen Louise (Breed) Piper

July 11, 1938 — December 21, 2016

I am sad to report that Karen Piper, long-time business manager of *The NUCLEUS*, administrator of the Esselen Award and one time NESACS Administrative Secretary passed away on December 21 at her home in Harvard, Massachusetts. Karen is survived by her husband, James U. Piper, long-time and recently retired, Treasurer of NESACS. She is also survived by daughters Jeananne C. Piper Grady and husband Alexander of Hingham and Jessica L. Piper Leahy and husband Michael of Boston. She was predeceased by infant twin sons, James and Jonathan.

In her role as Business Manager, Karen meticulously maintained financial records, worked with Vince Gale on *Nucleus* advertising and printers, developed budgets, billed the advertisers, did collections and maintained the mailing list. This was all done quietly and seamlessly from her home in Harvard. Karen, occasionally, visited us at our monthly Board of Publications Meetings or called in. Her work was very much behind the scenes, but critical to managing *The Nucleus*.

We were pleased in 2012 to recognize her efforts with the Arno Heyn Memorial Book Prize. In April Karen was a guest of the Esselen Award Committee in recognition of her long-relationship with the Esselen Family and administration of the award. Karen was flawless in this endeavor as I always received the award information for publication in *The Nucleus* within the deadline and complete in all details. Soon after I would receive the text of the Esselen Award address. Karen ran a tight ship!

Karen had a very strong bond with the Esselen Family and maintained her role as administrator of the Esselen Award despite having resigned as NESACS Administrative Secretary in 1992.

For her many years of contributions to NESACS in collaboration with Jim Piper, she was, along with Jim (also the 1990 Hill Awardee), the 2016 Henry A. Hill Award Recipient. It is great that Karen received these recognitions for nearly 30 years of service to our Section. She will be missed. What follows is a description in Karen's own words of her contributions to NESACS over the years. (M. Filosa) ◇

(L-R) Anthony Cromwell (Tony) Hill, son of Henry A. Hill, with Karen and Jim Piper, 2016 recipients of the Henry A. Hill Award for Outstanding Contributions to NESACS. *Photos by Morton Z. Hoffman*

(L-R) Janice Meisenhelder-Heyn, 2012 Awardee, Karen Piper, and Robert Heyn.

Karen Piper (second from the left), winner of the 2012 Arno Heyn Memorial Book Prize for contributions to NESACS publications, flanked by (from left) Jim Piper, NESACS Treasurer; Mike Filosa, Editor of The Nucleus; Mary Mahaney, Chair, NESACS Board of Publications.

Karen Piper

By Karen Piper

Reprinted from the February 2014 Nucleus

I began working for the Section in 1987 when Janice Fineman had resigned as administrative secretary and David Howell had taken over those duties while the Section looked for a replacement. The company for which I was office manager had been sold two years earlier, and I was in the process of starting a bookkeeping/payroll services business.

The Section hired me as the administrative secretary, and I recall going to Northeastern to pick up the Section's files

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Cover: *Jack W. Szostak, 2009 Nobel Laureate in Physiology or Medicine; Professor of Genetics, Harvard Medical School; Professor Department of Chemistry and Chemical Biology, Harvard University; Investigator Howard Hughes Medical Institute; Alexander Rich Distinguished Investigator, Massachusetts General Hospital. (Photo by Li Huang).*

Editorial Deadlines: *April 2017 Issue: February 15, 2017*
May 2017 Issue: March 15, 2017

THE NUCLEUS

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Gabor A. Somorjai - 2016 Richards Medalist

Report of the Richards Medal Award Committee

Morton Z. Hoffman, Chair (July 1, 2015-June 30, 2016)
Jerry P. Jasinski, Chair (July 1, 2016-June 30, 2017)

During 2016, the Committee was composed of Morton Hoffman, Jerry Jasinski, Sheila Hauck, and Mary Jane Shultz. The terms of Hoffman and Jasinski continue until June 30, 2017; the terms of Hauck and Shultz run until June 30, 2019.

The 2016 Theodore William Richards Medal Award meeting will take place on Thursday, March 23, 2017. The dinner will be held in Loeb House and the ceremony in the Pfizer Lecture Hall at Harvard University.

The call for nominations appeared in *C&E News*, *The NUCLEUS*, and on the NESACS website in a timely manner. In addition, the information about the award was sent to ACS Local Sections and Technical Divisions for dissemination to their membership.

Despite the problems the Committee had working with Medalcraft Mint of Green Bay, Wisconsin, on the design and execution of the shadowbox for the 2014 award in anticipation of its presentation in March 2015, the Committee decided to utilize that company's services again because of its experience in providing an excellent product and upon receipt of strict promises (with penalties for noncompliance). As in 2015, the awardee will receive a silver medal at the presentation ceremony; a gold-plated bronze medal will be part of the shadow box, which will also contain the inscribed plaque.

The four members of the Committee together with two external members viewed the outstanding nomination packets of 14 candidates, and selected Dr. Gabor A. Somorjai, Professor of Chemistry at the University of California at Berkeley and Faculty Senior Scientist in the Materials Science Division of the Lawrence Berkeley National Laboratory, as the recipient of the 2016 Theodore William Richards Medal Award for his pioneering experimental and conceptual contributions to the understanding of surface chemistry and catalysis at a microscopic and molecular level.

Professor Somorjai has been awarded membership in scientific societies of five nations; he has been recognized with 12 honorary degrees, and has received many awards and medals including the Honda Prize (2011), the ACS Priestley Medal (2008), the Langmuir Prize from the American Physical Society (2007), the Cotton Medal (2003), the U.S. National Medal of Science (2002), the Pauling Medal (2000), the Wolf Prize in Chemistry (1998), and the Henry Albert Palladium Medal (1986). He has coauthored over 1,200 papers in the areas of surface science, heterogeneous catalysis, and solid state chemistry, written 4 books, trained 140 graduate students and more than 250 postdoctoral students, of whom over 100 are in faculty positions with the others in institutes or leaders in industry. ◇

ResMed: Residential School on Medicinal Chemistry and Biology in Drug Discovery
June 12-16, 2017
Drew University, Madison, NJ

This graduate level course concentrates on the fundamentals that are useful in drug discovery spanning initial target assay evaluation through clinical development. Several case histories of recent successful drug development programs will also be presented. The five-day program covers:

Principles of Med Chem	DMPK
Cheminformatics	Toxicophores
Lead ID & Optimization	GPCRs
Epigenetics	Kinase Inhibitors
Fragment-based Drug Design	Ion Channels
Structure-based Drug Design	Enzyme Inhibitors
Drug-like Properties	Bioisosteres
Plasma Protein Binding	Preclinical Tox
Molecular Modeling	Clinical Dev
Protein-Protein Interactions	Case Histories
Antibody-Drug Conjugates	

W. Greenlee, V. Gullo and R. Doll –*Co-organizers*

Attendees will be staying at The Madison Hotel
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Find yours at www.nesacs.org/jobs

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Monthly Meeting

The 967th Meeting of the Northeastern Section of the American Chemical Society

Thursday, February 9, 2016
Novartis Institutes for BioMedical Research
250 Massachusetts Ave, Cambridge, MA 02139

4:30 pm **Board Meeting**

5:30 pm Social Hour

6:30 pm Dinner

7:30 pm Leland L. Johnson Jr., NESACS Chair, Presiding

Keynote Presentation: Dr. Jack W. Szostak, Professor of Genetics, Harvard Medical School, Professor of Chemistry and Chemical Biology, Harvard University. Investigator, Howard Hughes Medical Institute and Distinguished Investigator, Masschusetts General Hospital.
2009 Nobel Laureate in Physiology or Medicine.
Title: *The Origin of Cellular Life*

YOU MUST REGISTER IN ADVANCE TO ATTEND THE MEETING: DINNER RESERVATIONS ARE REQUIRED.

THE PUBLIC IS INVITED

- For those who would like to join us for dinner, register by noon, Thursday, February 2nd, using Eventbrite.
- **To register, please use the link at:** http://www.nesacs.eventbrite.com/
- Cost: Members, $30; Non-members, $35; Retirees, $20; Students, $10. Dinner reservations not cancelled at least 24 hours in advance must be paid.
- If you wish to join us for this meeting and not eat dinner, please register by noon, Thursday, February 5, using the Eventbrite link above.
- New members or those seeking additional information, contact the NESACS administrative coordinator, Anna Singer, at secretary@nesacs.org or at (781) 272-1966 during regular business hours only.
- **Please note: the office is open on a part-time basis only**

Directions to NIBR:
Directions: From the Massachusetts Turnpike: Take exit 18 toward Brighton/Cambridge. Keep right at the fork to continue toward Cambridge St and merge onto Cambridge St. Continue onto River St/River St Bridge. Continue to follow River St. for 0.8 mi to Central Square. Turn right at Massachusetts Ave. Destination will be on the right 0.5 mi.
Parking: Shaw's (Star) Supermarket parking garage, using the entrance on Franklin or Green Streets.
By Public Transportation: Take the MBTA Red line to the Central Square stop and proceed to 250 Massachusetts Ave. ◇

The NESACS website

Updated frequently · Late-breaking news · position postings
Back issues of the Nucleus archived · Career-related Links · Awards and Scholarships

WWW.NESACS.org

Biography:

Dr. Szostak is an Investigator of the Howard Hughes Medical Institute, Professor of Genetics at Harvard Medical School, Professor of Chemistry and Chemical Biology at Harvard University, and the Alex Rich Distinguished Investigator in the Dept. of Molecular Biology and the Center for Computational and Integrative Biology at Massachusetts General Hospital.

Dr. Szostak's early research on telomere structure and function, and the role of telomere maintenance in preventing cellular senescence was recognized by the 2006 Albert Lasker Basic Medical Research Award and the 2009 Nobel Prize in Physiology or Medicine.

In the 1990s Dr. Szostak and his colleagues developed *in vitro* selection as a tool for the isolation of functional RNA, DNA and protein molecules from large pools of random sequences. Dr. Szostak's current research interests are in the laboratory synthesis of self-replicating systems and the origin of life. ◇

Abstract:

The complexity of modern biological life has long made it difficult to understand how life could emerge spontaneously from the chemistry of the early earth. We are attempting to synthesize very simple artificial cells in order to discover plausible pathways for the transition from chemistry to biology. Very primitive cells may have consisted of a self-replicating nucleic acid genome, encapsulated by a self-replicating cell membrane. A chemically rich environment that provided the building blocks of membranes, nucleic acids and peptides, along with sources of chemical energy, could have led to the emergence of replicating, evolving cells. However, no process for the replication of a nucleic acid genome, independent of evolved enzymatic machinery, has yet been described. I will discuss our recent progress towards the realization of an efficient and accurate system for the chemical replication of RNA. ◇

Nominations for ACS Fellows

April 1, 2017 Deadline

NESACS wishes to nominate candidates for the ACS Fellows Program, which was created to recognize members for outstanding achievements in and contributions to science, the profession, and the Society. Nominations are now open. For more details, see <https://www.acs.org/content/acs/en/funding-and-awards/fellows.html>.

The fundamental criteria for selection as a Fellow are:

- Documented excellence and leadership that has an impact on the science, the profession, education, and/or management.
- Documented excellence and leadership in volunteer service, based on specific results achieved, in service to ACS and its membership and community.

Nominations will only be accepted online at https://www.nominatefellow.acs.org during the period Feb. 1–Apr. 1, 2017. Resource documents including a nomination checklist, online system instructions, and browser requirements can be downloaded from www.acs.org/fellows .

NESACS members are requested to nominate (or self-nominate) candidates for ACS Fellows. Preparation of a comprehensive application package includes resume, qualifications form and three letters of recommendation. For additional information, contact Mukund S. Chorghade <chorghade@verizon.net>.◇

Call for Nominations

The 2017 James Flack Norris Award for Outstanding Achievement in the Teaching of Chemistry

Deadline: April 15, 2017

Nominations are invited for the 2017 James Flack Norris Award, which consists of a certificate and an honorarium of $3,000 and is given annually by the Northeastern Section (NESACS). The presentation will take place at a ceremony and dinner in November 2017, and will include a formal address by the awardee. The Award was established in 1950 by NESACS to honor the memory of James Flack Norris (1871-1940), a professor of chemistry at Simmons College and M.I.T., chair of NESACS in 1904, and ACS President in 1925-26.

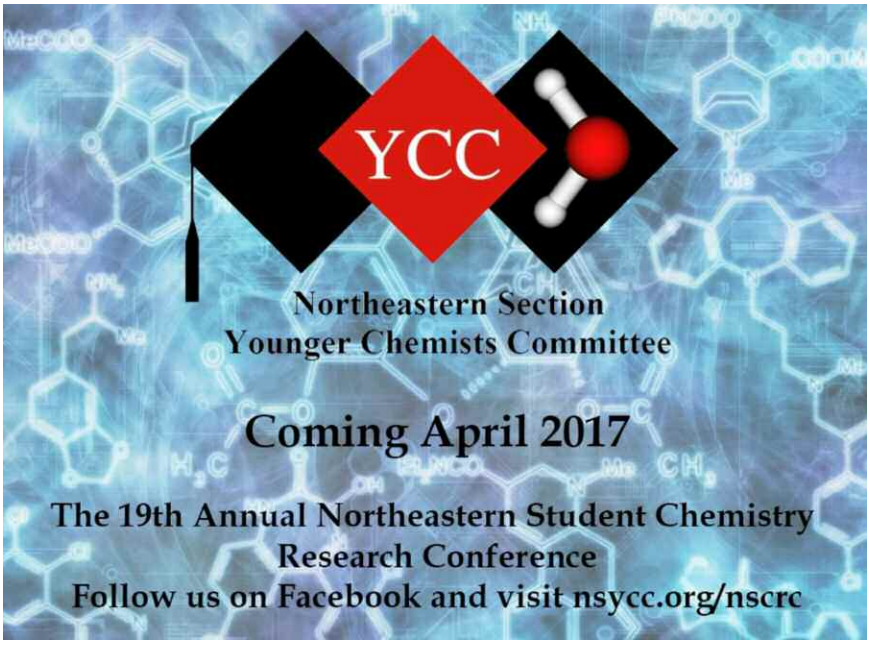
Individuals or teams of individuals may be nominated. Nominee(s) should have served with special distinction as teachers of chemistry at any level: secondary school, college, and/or graduate school. With the presentation of the first Award in 1951, awardees have included many eminent teachers at all levels whose efforts have had a wide-ranging effect on chemical education. The recipient will be selected from an international list of nominees who have served with special distinction as teachers of chemistry with significant achievements.

A nomination in the form of a letter should focus on the candidate or candidates' contributions to and effectiveness in teaching chemistry. Curriculum vitae should be included and, where appropriate, a list of honors, awards, and publications related to chemical education. Seconding letters may also be included; these should show the impact of the nominee or nominees' teaching for inspiring colleagues and students toward an active life in the chemical sciences, and attest to the influence of the individual or team's other activities in chemical education, such as textbooks, journal articles, or other professional activity at the local, national, and international level.

The nomination materials should consist of the primary nomination letter, supporting letters, and curriculum vitae. Reprints or other publications should NOT be included. The material *should not* exceed thirty (30) pages [if individual], and should be submitted electronically in Adobe PDF format through **April 15, 2017** to Ms. Anna Singer, NESACS Administrative Secretary <secretary@nesacs.org>.

For more information about the Award including a list of past award recipients, see <http://www.nesacs.org/awards_norris.html>.

Questions about the Award or the nomination process should be directed to the Chair of the Norris Award Committee, Dr. Mark Tebbe, <tebbe.mj@gmail.com>◇



For late breaking news, jobs and the latest meeting and event information
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Summer Scholar Report

An Instrument for Dispensing and Patterning Single Microbeads

Harry T. Paul, Daniel J. Wilson, and Charles R. Mace*
Department of Chemistry, Tufts University, 62 Talbot Avenue, Medford, MA, 02155

Abstract
We present an instrument for the placement and patterning of single microbeads by dispensing. We dispense these beads using a borosilicate glass micropipette, fabricated using a customized micropipette puller, which is visualized in a custom-fabricated upright microscope. This microscope has a motorized sample stage, which enables reproducible patterning in two dimensions. Our instrument has the potential to array microscale constructs at a resolution not attainable by commercial microarraying equipment, and has substantial implications for biological studies and tissue engineering.

Introduction
Since the invention of microarrays in the 1980s, microscale deposition of biological material on solid substrates has enabled myriad studies of human health. In studies of single cells, arrays are typically created by controlling surface chemistry (e.g., microcontact printing of cell-sized adhesive zones on a culture material[1]) or surface topography (e.g., fabrication of microwells for single-cell capture[2]). These approaches effectively capture cells for analysis, but do not allow for real-time control during the patterning process. Array geometry is determined prior to patterning, as these passive approaches rely on the probability of specific cell-substrate interactions, rather than active positional control of individual cells during the patterning process.

Active control of cellular position in real-time can be achieved by using an additive manufacturing approach. One type of additive manufacturing, 3D printing, has become widely accessible to hobbyists, educators, and scientists in recent years. Material extrusion is not only useful for the rapid fabrication of plastic parts, but for soft, biological objects as well. In bioprinting, a cell-laden ink or hydrogel is dispensed from a needle to produce biocompatible scaffolds. This approach can be used to create two and three-dimensional, hollow and solid products including whole organ replacements and mini-tissues, which are small functional tissue units that can self-assemble into a larger construct.[3] The biocompatibility of these components allows for successful integration into the body, as well as participation in natural biological processes (e.g., angiogenesis).[4] At present, applications of bioprinting range from hollow vasculature to whole kidney prototypes,[5] and this approach is only beginning to be explored.

While the extrusion of cell-laden inks holds great promise for many biological and health-related problems, the field of bioprinting is currently limited by the availability of materials that are printable, as well as the resolution at which these materials can be printed. To facilitate successful bioprinting, the selected material must have specific rheological and crosslinking properties, while also being sufficiently biocompatible. For these reasons, bioprinting inks are typically limited to collagen, hyaluronic acid, alginate, modified copolymers, photocured acrylates,[5] and ECM (extracellular matrix) mimics such as Matrigel.[6] Depending on the cost, technical features, and type of bioprinting system used, the resolution at which these materials are printed can range from microns to millimeters. In order for the capabilities and clinical relevance of bioprinting to advance, limitations on both size resolution and material selection must be lifted.

One potential solution to these problems is to eliminate the need for carrier inks, and print wholly cellular microstructures one cell at a time. Single-cell resolution can be enabled by micropipettes, which have previously been used to isolate single cells from culture for subsequent analysis. These separations, as well as studies of single-cell mechanical properties by micropipette aspiration, are both enabled by fine control of fluid flow through the micropipette. A handful of commercially available systems[7] possess the machinery to perform single-cell arraying by dispensing, but are not conventionally used to do so. These instruments are very specifically designed to transfer single cells from one container (e.g., a culture dish) to another (e.g., a 96-well plate) for single-cell analysis. In addition to being highly specialized, these systems are also expensive, and often not available to academic laboratories.

To enable ink-free bioprinting with single-cell resolution, we have developed an instrument that allows for real-time visualization of a cell-dispensing glass micropipette positioned just above a culture surface. We use 10 μm polystyrene beads (Polysciences) as model cells to demonstrate the performance of the first iteration of our system. It is our belief that this instrument lays the foundation for high-resolution, ink-free bioprinting of 2D cell patterns and micro-tissues. In the future, a more refined version of this preliminary tool could be used to answer fundamental questions of tissue engineering and biology, specifically those related to cell communication and tissue formation.

Results and Discussion
We constructed an upright microscope to allow for visualization of bead dispensing during experiments (**Figure 1**). Using a milling machine, we fabricated a custom aluminum plate to connect a large optical post to an existing microscope base (Leica). This base contained a brightfield illumination source, and also held the motorized XY stage (Leica) used for manipulation of the culture surface. Next, we connected a microscope carrier with manual focus controls (Olympus) to the optical post, and used a custom 3D-printed (MakerBot) adapter to attach a DIN microscope tube (Edmund Optics) to the carrier. This tube enabled mounting of the objective lenses (Olympus, Edmund Optics) and camera (Motic).

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Summer Scholar Report

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After development of the imaging system, we added micropipette equipment to enable dispensing experiments. We attached an aluminum collar to the optical post, and used it to connect a 3D-printed arm used to hold the micropipette holder (Warner Instruments) in place. The printed arm held the micropipette holder at a 30° angle relative to the sample stage, which allowed for adequate visualization of the pipette tip inside the sample container, which is a standard Petri dish. This micropipette holder was connected to a syringe using plastic tubing (Nalgene) and luer lock fittings (McMaster-Carr). A syringe pump (Chemyx) was used to control fluid flow through the micropipette. After completion of the instrument, we used custom glass micropipettes to demonstrate the capabilities of our tool.

To fabricate our micropipettes, we used a custom-modified micropipette puller. Micropipettes are created by controlled heating and pulling of hollow glass capillaries. The heating element is usually made of platinum, and pullers are offered in vertical and horizontal configurations. In vertical pullers such as ours (Narishige), which can produce a wide variety of tip geometries, pulling force is controlled by adjusting the pull distance and pull mass. Commercial vertical pullers come with a set of masses that are connected to the bottom of the glass capillary in different configurations to achieve different tip geometries. These masses are heavy and only come in two sizes (i.e., 23 or 92 g), precluding fine control over pulling force.

For dispensing experiments using 10 μm polystyrene beads, we sought to produce pipettes with a 10-30 μm inner diameter. We attempted to fabricate these pipettes by a two-step pull, in which the capillary is first allowed to fall a set distance (Distance 1) at one heater setting (Heat 1). Next, the heating element moves (by Distance 2) to the center of the hourglass shape formed by the first pull, and the filament is heated to a second setting (Heat 2). On the second pull, the pipette falls the full range of the puller, breaking the capillary at the center of the pulled, microscale section. To fabricate pipettes by the standard approach, we used the following settings—Distance 1: 1 mm, Distance 2: 2 mm, Heat 1: 70 V, Heat 2: 60 V—and a total pulling mass of 117 g.

Using the standard weights of the device, we could not produce our desired geometries using the puller only. Pipettes pulled using the standard approach (**Figure 2A**) had ~ 50 μm diameters and required a secondary fabrication step known as microforging, in which the pipette tip is brought within proximity of a heated filament to melt and smooth imperfections that are a result of pulling. We used a microforge (Technical Products International) to fire-polish these pipettes and reduce their diameter to an acceptable size, but difficulties associated with microforging (e.g., tip distortion due to melting) led to irreproducible pipette geometries. To circumvent the issues associated with this time-intensive protocol, we fabricated custom weights to enable microforge-free production of 10-30 μm micropipettes.

To facilitate the attachment of desired masses to the puller, we designed an aluminum piece that had the same mounting features as the manufacturer's weights, and also had a threaded hole (8-32) to which we could attach a rod. After fabrication of the aluminum piece, we attached 3D-printed weights, designed using commercial (SolidWorks) and open-source (OpenSCAD) programs, to the adapter rod. We controlled the masses of 3D-printed pieces using different design

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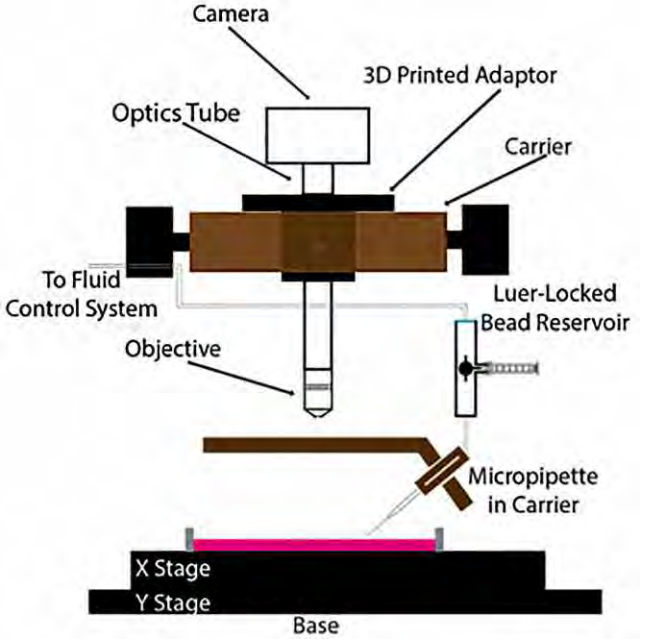

***Figure 1**: Schematic of the microbead-dispensing instrument. An upright microscope is used to visualize the bead-filled glass micropipette, which is driven by a syringe pump. A motorized XY stage is used to manipulate the sample container, facilitating reproducible bead patterning.*

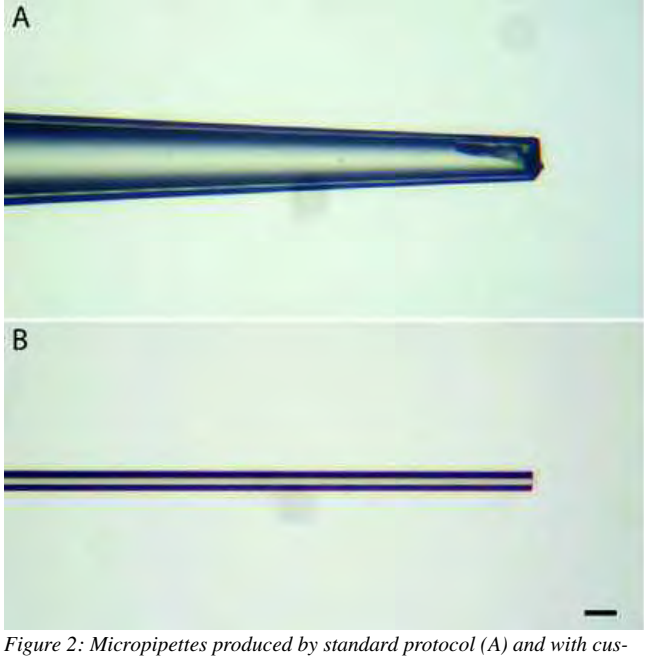

Figure 2: Micropipettes produced by standard protocol (A) and with custom weights (B). Scale bar is 50 μm.

Summer Scholar Report

Continued from page 8

volumes and infill densities. The threaded rod attached to the puller also facilitated the attachment of metal hardware (e.g., washers, nuts, standoffs) that could be used to adjust pull force with greater resolution than the manufacturer's weights. The final protocol for production of our pipettes was a two-step pull, which required both 3D-printed components and off-the shelf metal standoffs. For these pipettes, we used the following settings—Distance 1: 0.5 mm, Distance 2: 1 mm, Heat 1: 78-82 V, Heat 2: 68-72 V—and a total pulling mass of 350 g. By design, the pulled capillary was not separated into two pipettes by the puller. After the second pull step, we pulled the bottom half of the capillary downward by hand, breaking it away from the remainder of the capillary. The bottom pipette was saved for use, and the remainder of the capillary was discarded. Pipettes pulled by this approach (**Figure 2B**) produced 23 μm diameter pipettes (n=39), reducing the range in pipette diameter by 55 μm, from 73 to 18 μm, when compared to the conventional method (**Figure 3**). These micropipettes had flat tips, perpendicular to their parallel walls.

To demonstrate the capabilities of our instrument, we used our glass micropipettes to dispense 10 μm polystyrene beads onto a model culture surface. We designed and purchased a Mylar lithography mask (Advanced Reproduction Corp.) patterned with simple shapes (e.g., lines, circles, squares) to serve as a target for our dispensing experiments. The lines on this target were 25, 50, and 75 μm thick to allow for visualization in the microscope. We loaded a 10^5 bead/mL bead solution into the micropipette before mounting it to the holder, and used a flow rate of 1 μL/minute applied by a 3 mL syringe to drive beads out of the micropipette and onto the target surface. Bead dispensing accuracy was quantified by image analysis (**Figure 4**). In our preliminary experiments, beads landed an average of 90 ± 10 μm from the intended culture surface feature, a line, and the total range of these distances was 156 μm.

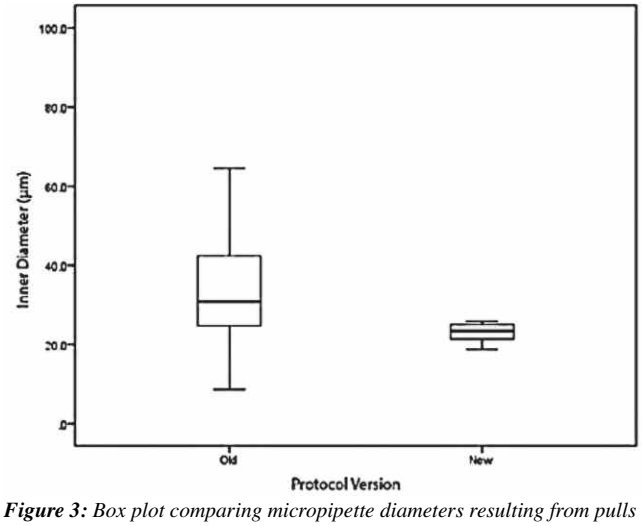

Figure 3: *Box plot comparing micropipette diameters resulting from pulls performed using standard and custom equipment.*

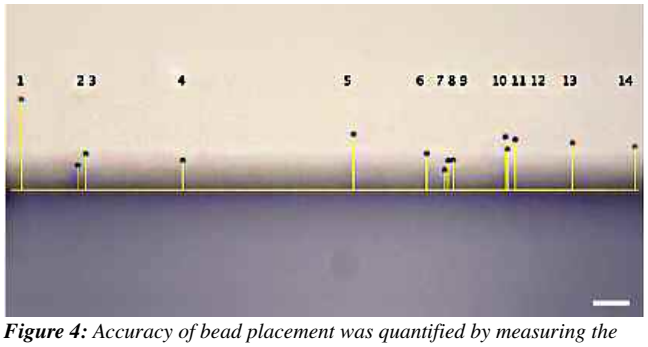

Figure 4: *Accuracy of bead placement was quantified by measuring the distance between dispensed beads and the intended patterning target. Scale bar is 100 µm. To acquire this image, a human hair was taped to the bottom of the sample container and used as a linear target.*

Conclusions

In conclusion, we present an approach for high-resolution additive manufacturing of simple cellular microstructures. By developing a new bead dispensing instrument and method for the reproducible manufacture of glass micropipettes, we demonstrate substantial progress toward this goal. While this tool does not yet possess the accuracy or reproducibility necessary for ink-free bioprinting of cellular micro-tissues, future design iterations—including automation of the motorized stage and more precise control of bead flow through the micropipette—could hold great promise for fundamental studies in tissue engineering, cell signaling, and developmental biology.

Acknowledgements

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Karen Piper

Continued from page 2

from Dave. Dave was a pillar of the Section's Board, having been Editor of *The Nucleus*, Section Treasurer, and Secretary. He was, however, not notable for being organized, and I recall retrieving files from an office in which one's physical welfare seemed threatened by the piles of paper inside. Fortunately, Janice had been an extremely organized secretary, and the files were in good order.

I had the good fortune to be the administrative secretary during the chairmanships of Lloyd Taylor, Tom Gilbert, Mike Strem, Joe Billo, Chuck Kolb, and Katie Stygall. At that time, the annual reports to National were all on paper, and during January, my living room was covered with piles of paper for the seven copies that needed to be made. It was gratifying to receive the ACS Large Section Award in 1990 for the chairmanship of Mike Strem.

Recalling my work as administrative secretary brings to mind many stories, but the best memories are of the people I was privileged to work with. Phyllis Brauner was my mentor. She had large ideas and usually was able to get them to happen. Ed Atkinson, Dick Handrick, Arno Heyn, Dave Howell, Ted Light, and a host of others, now departed, were people who cared deeply about the Section and were easy to work with.

Janice Fineman had worked closely with Richard Handrick, and she kept records for the Trustees for which Dick acted as Treasurer. I took over these records, and then, when Bill Adams at Salem State decided to give up the position of Business/Advertising manager of *The Nucleus*, those positions passed to Russ McCann and Vince Gale.

I inherited the Business Manager's position from Russ McCann in 1991. Later, I took over the circulation manager's responsibilities from Dick Handrick. Dick kept *The Nucleus* mailing list on 3X5 cards and transferred them to IBM punch cards which were processed by Wang Laboratories. I was able to put the list into a dBase III file and print the cheshire labels in my office.

I was also administrative secretary during the first years of the Esselen Award, as a result of which I developed a close relationship with members of the Esselen family. I had the privilege of working with Arno Heyn when he became editor of *The Nucleus* in 1989.

When Arno assumed the chairmanship of the Esselen Award Committee in 2003, I had the opportunity to renew that relationship. His graciousness coupled with his attention to detail made that year very rewarding. Receiving the Arno Heyn book prize in 2012 in recognition of our relationship was an unexpected pleasure.

In 1992 I left the position of administrative secretary and it eventually passed into the very capable hands of Marilou Cashman and, now, to Anna Singer. I have retained my connections with the Trustees, *The Nucleus*, and the Esselen Committee. The Business Manager also serves as the circulation manager for *The Nucleus*, works closely with the Advertising Manager, Vince Gale, and is responsible for accounting. After 25-plus years of association with the Section, it is satisfying and rewarding to see the continuation of dedicated people carrying on the traditions of the Northeastern Section. ◇

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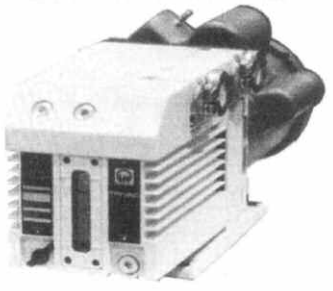

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February 1

Prof. Amy Andreotti (Iowa State)
"Nuclear magnetic resonance; Macromolecular structure and recognition."
Northeastern, 129 Hurtig Hall 12:00 pm

February 6

Prof. Joe Hupp (Northwestern)
Brandeis University, Gerstenzang 121 4:00 pm

Prof. Eitan Geva (Michigan)
Boston University, Life Sciences and Engineering Building, Rm B01
4:00 pm

February 7

Prof. Wilfred Ngwa (Dana-Farber/Harvard)
Tufts, Pearson, Rm. P106
4:30 pm

February 8

Prof. Stefan Howorka (University College London)
"Nanotechnology and Nucleic Acids."
Northeastern, 129 Hurtig Hall 12:00 pm

February 9

Prof. X. Peter Zhang (Boston College) & Prof. Tristan Lambert (Columbia)
MIT, Room 6-120 4:00 pm

February 13

Prof. Zhongping Tan (U. of Colorado-Boulder)
"Study and application of protein O-glycosylation."
Brandeis, Gerstenzang 121
4:00 pm

Prof. David Masiello (Wisconsin)
Boston University, Life Sciences and Engineering Building, Rm B01
4:00 pm

Prof. Daniel Kahne (Harvard)
Harvard, Pfizer Lecture Hall 4:15 pm

February 14

Prof. Zhongping Tan (Univ. of Colorado-Boulder)
Tufts, Pearson, Rm. P106 4:30 PM

February 15

Prof. Zhongping Tan (Univ. of Colorado-Boulder)
"The effects of glycosylation on protein structure and activity."
Northeastern, 129 Hurtig Hall 12:00 pm

February 16

Prof. Alison Frontier (Univ. of Rochester)
MIT, Room 6-120 4:00 pm

February 21

Prof. Kwok-Fan Chow (UMass-Lowell)
Univ. of New Hampshire, Parsons N104
11:10 am

Prof. Bing Xu (Brandeis University)
Boston College, Merkert 130
4:00 pm

February 22

Prof. Christine Thomas (Harvard/MIT)
Harvard, Pfizer Lecture Hall
4:15 pm

Prof. Paula Hammond (Oregon Health and Science University)
"Biological imaging at the nanometer and single-molecule scales; spatial systems biology and cancer biomedicine."
Northeastern, 129 Hurtig Hall 12:00 pm

February 27

Prof. Tatyana Polenova (Univ. of Delaware)
Brandeis, Gerstenzang 121
4:00 pm

Prof. Andrea Tao (UCal-San Diego)
Boston University, Life Sciences and Engineering Building, Rm B01 4:00 pm

Prof. Elad Harel (Northwestern)
Harvard, Pfizer Lecture Hall 1:50 pm

February 28

Prof. Michael A. Daniele (NC State)
Univ. of New Hampshire, Parsons N104
11:10 am

Prof. Eric Jacobsen (Harvard)
Tufts, Pearson, Rm. P106 4:30 pm

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