



The University of Iowa
Department of Biochemistry

BIOCHEMISTRY @ IOWA

Dear Alumni & Friends of Iowa Biochemistry,

Allow me to introduce myself. In October, 2008, I had the life-changing experience of getting a cold call from **Daryl Granner**, who asked me if I would consider interviewing for the position of Head of Biochemistry at the University of Iowa. My laboratory focuses on discerning the normal functions of tumor suppressor genes and on uncovering novel pathways and regulation in NAD metabolism. I am an East Coast guy who trained at Stanford and Brandeis and held independent positions at Jefferson and Dartmouth. Until the spring of 2009, my family and I thought that we'd spend our lives at Dartmouth. However, the charms of Iowa City, the remarkable shared resources at the UI, the superb faculty in Biochemistry, and the opportunity to contribute to the growth of such an outstanding Department lured us away from the mountains of New Hampshire to the rolling hills of Iowa, effective July, 2009. My family, research group and I are truly happy to be here.



The 2009-2010 academic year has been a dynamic one for Biochemistry. Many transitions occurred this year, and four of them were bittersweet. **Alice Fulton** transitioned to Emerita, which we honored with a celebration attended by Alice's former students (p. 6). **S. Ramaswamy** took a permanent position as Dean of the Institute for Stem Cell Science in Bangalore, India. Rams remains associated with us as Adjunct Professor. In addition, two secondary appointees bid us farewell. **Rama Mallampalli** is now Chief of the Pulmonary Division at the Pittsburgh VA and directs the Acute Lung Injury Center at UPitt. **Peter Nagy** was recruited to Pathology & Cell Biology at Columbia, where he is also Assistant Director of Molecular Diagnosis.

The Department has been highly active in faculty recruiting (p. 2). Emerging from our national search, **Sheila Baker** from Duke University joined us effective July, 2010, as an Assistant Professor, and **Miles Pufall**, now at UCSF, will join us in July, 2011, as an Assistant Professor. We also welcomed **Heather Bartlett**, Assistant Professor of Pediatrics, as a secondary appointee and **Liping Yu**, Director of the CCOM NMR Facility, as an Adjunct Professor.

Our research base rose greater than 40% to nearly \$7 million in annual total costs. Faculty garnered more than 5 units of ARRA funding and scored renewals and new grants in a difficult funding environment. In particular, we recognize the NSF CAREER Award to **Ernesto Fuentes** (p. 3). We also highlight high-profile publications by **Todd Washington** and **David Price** (p. 3). Our postdoctoral fellows, graduate students, and undergraduates earned prestigious fellowships and awards (p. 4-5), and we cracked the bubbly 9 times for 9 graduating PhDs.

I encourage you to visit the Biochemistry website at biochem.uiowa.edu. The latest news on our home page is piped from the new Biochemistry blog (available at medcom.uiowa.edu/biochem). In the blog, we describe substantive achievements of our students, fellows, faculty, staff and alumni. For those with an interest in Departmental history, please visit medcom.uiowa.edu/biochem/?p=169, which links to the full, searchable text of **Clarence Berg's** 1980 monograph, *The University of Iowa and Biochemistry from their Beginnings*.

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It has been a great honor this year to meet alumni and friends of the Department. We plan to celebrate the Department's 65th birthday in the summer of 2013. If you'd like to help organize this event, please contact me. Until then, please continue to share your news and send us your best and brightest students, postdoctoral and faculty candidates. There is always exciting work to do in Biochemistry!

From the Bowen Science Building, I wish you all the very best,

Charles Brenner
Roy J. Carver Chair and Head of Biochemistry
Departments of Biochemistry and Internal Medicine

BIOCHEMISTRY FACULTY

- Charles Brenner, Head
- Lori Wallrath, Vice Chair
- Sheila Baker
- Heather Bartlett
- John Dagle
- Kris DeMali
- John Donelson
- Adrian Elcock
- Ernesto Fuentes
- Pamela Geyer
- George Giudice
- Shahram Khademi
- Bryce Plapp
- David Price
- Peter Rubenstein
- Madeline Shea
- Elisabeth Swain
- M. Todd Washington
- Daniel Weeks
- Ronald Weigel
- Marc Wold

ADJUNCT FACULTY

- Theresa Gioannini
- Miles Pufall
- S. Ramaswamy
- Nancy Stellwagen
- Joseph Walder
- Liping Yu

EMERITUS FACULTY

- Arthur Arnone
- Thomas Conway
- Alice Fulton
- Rex Montgomery
- Arthur Spector
- Earle Stellwagen
- Charles Swenson

BIOCHEMISTRY STAFF

- Brenda Kunkel
- Karen LeVelle
- Paul Rogers
- Rosemary Stratton

BIOCHEMISTRY STORES

- Justin Rogers, Interim Director
- Don Boehme
- Lori Streb

Department of Biochemistry

(319) 335-7932 office
(319) 335-9570 fax
(877) 846-8569 toll-free
biochem@uiowa.edu
biochem.uiowa.edu

FACULTY FOCUS

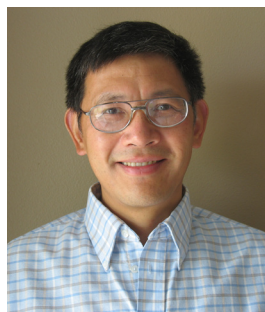


Sheila Baker, PhD, joined the faculty as an Assistant Professor. Dr. Baker comes to Biochemistry from the laboratory of **Vadim Arshavsky** at Duke University. Dr. Baker first embarked on a career in research after being inspired by her undergraduate genetics professor, **Doug Post**, at the University of Wisconsin-Stevens Point. She completed her PhD at the Medical College of Wisconsin in 2003 under **Joseph Besharse**, where she investigated the role of intraflagellar transport in vertebrate photoreceptors. Dr. Baker began postdoctoral studies with Dr. Arshavsky at Harvard Medical School/Massachusetts Eye & Ear Infirmary and later moved with him to the Duke Eye Institute. As a postdoctoral fellow, Dr. Baker continued studies of photoreceptors, determining how the anchor protein R9AP controls the stability, subcellular localization, and enzymatic activity of RGS9, the enzyme responsible for the rate-limiting step of phototransduction deactivation. *The aim of her new lab is to define at the molecular level the protein trafficking pathways used by photoreceptors.* Dr. Baker is funded by a 5-year R01 from the National Eye Institute.

Heather Bartlett, MD, joined Biochemistry as a secondary appointee. Dr. Bartlett came to Iowa in 2000 to complete a fellowship in Pediatric Cardiology, where she worked with **Dan Weeks** to elucidate the role of Nkx2-5 in heart development. Dr. Bartlett accepted a faculty appointment in Pediatrics in 2004 to establish a research program to study congenital heart disease and to serve as Director of the Pediatric Cardiology Fellowship Program. *In collaboration with Dr. Weeks, one focus of Dr. Bartlett's group is to understand the genetic regulation of heart development. In addition, she collaborates with Peter Rubenstein to examine the biochemical effects of mutations in α -smooth muscle actin that are associated with congenital and*



early onset heart disease. Dr. Bartlett is funded by the American Heart Association and a Career Development Award from the National Institute for Child Health and Human Development.



Biochemistry welcomed **Liping Yu, PhD**, to the Department as an Adjunct Professor. As **Director of the NMR Core Facility**, Dr. Yu has collaborated extensively with CCOM faculty, including **Madeline Shea**, **Theresa Giannini**, and **S. Ramaswamy**, to investigate protein-peptide and protein-drug interactions. *The focus of Dr. Yu's research is NMR method development and application to improve understanding of biomolecular structures, function, dynamics, and recognition.* Prior to coming to Iowa in 2007, Dr. Yu worked at Abbott Laboratories and solved structures of important drug targets, including the amyloid β peptide oligomer associated with Alzheimer's disease, an inhibited potassium channel, and several essential *Streptococcus pneumoniae* gene products. Dr. Yu completed his PhD work with **Gary Smith** and postdoctoral studies with **Gerd La Mar** at UC Davis.

Effective July, 2011, **Miles A. Pufall, PhD**, will join the Department as an Assistant Professor. He is currently a postdoctoral fellow with **Keith Yamamoto** at UC San Francisco, where he is studying transcriptional regulation by the glucocorticoid receptor (GR). As a graduate student with **Barbara Graves** at Utah, he characterized a phosphorylation-dependent rheostat mechanism in the structure and function of the Ets-1 transcription factor. With Dr. Yamamoto, he found that different, related DNA operator sites produce different functional complexes with GR, producing different transcriptional outputs. *As an independent investigator, Dr. Pufall will extend these studies of sequence-specific allosteric regulation of DNA-binding proteins to understand how this regulation affects disease.* He is funded by a Howard Temin Award from the National Cancer Institute and is associated with the Department as an adjunct member.



FACULTY SPOTLIGHT

Four of our primary faculty members have assumed additional responsibilities: **Pamela Geyer** is the CCOM Graduate Education Coordinator; **Madeline Shea** is Director of the FUTURE Program; **Lori Wallrath** is Vice Chair of Biochemistry; and **Marc Wold** is Director of Undergraduate Studies and the Honors Program.

FACULTY AWARDS



Madeline Shea was the recipient of the 2009 **J.P. Long Teaching Award in the Basic Sciences**. She received this award for her teaching methods, outstanding mentoring, development of the FUTURE in Biomedicine Program (see p. 5), as well as her body of research on calmodulin structure and function. Dr. Shea was feted with this award at a Carver College of Medicine banquet at the Brown Deer Golf Club. Dr. Shea joins **Arthur Spector** (1999) and **Peter Rubenstein** (2001) as the third biochemist honored with this teaching award.

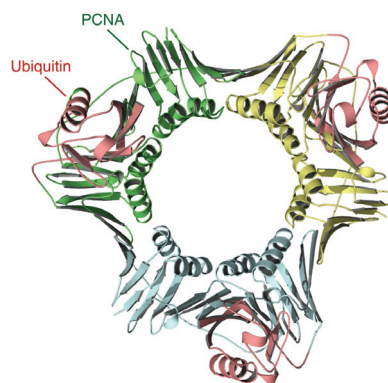


Ernesto Fuentes received a **CAREER Award** from the NSF. This prestigious five-year grant is given to early career teacher-scholars. The research component involves biophysical and biochemical studies of the guanine nucleotide exchange factor Tiam1 in the cellular processes of polarity, adhesion, and migration. The education component is two-fold: an annual biophysics workshop for faculty at Iowa undergraduate institutions and a summer honors tutorial series for high school and undergraduate students.

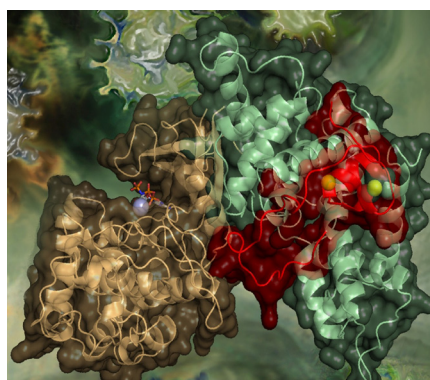
PUBLICATION HIGHLIGHTS

Investigators in the Department published 57 papers in 2009. Three papers in the new year are making a major impact.

In *Nature Structural and Molecular Biology* (v. 17, p. 479, 2010), **Todd Washington's** group defined how ubiquitylation of the proliferating cell nuclear antigen (PCNA) alters PCNA trimer function in DNA damage repair. In processive DNA replication, the PCNA trimer forms a sliding DNA clamp. However, when the replicative polymerase encounters a lesion, it is replaced by a specialized polymerase in an event that requires PCNA ubiquitylation. Washington and graduate student **Bret Freudenthal** developed a clever methodology to generate ubiquitylated PCNA for functional and crystallographic studies. These "split PCNA" constructs self-assemble when co-expressed in bacteria and yeast. This study showed that ubiquitylation occurs on the back face of PCNA, thereby facilitating polymerase exchange. **Lokesh Gakhar** and **S. Ramaswamy** also participated in this project.



Structure of ubiquitylated PCNA trimer. Photo courtesy of M. Todd Washington.



Structure of HIV-1 Tat with P-TEFb. Photo courtesy of T. Tahirov and N. Babayeva

In *Nature* (v. 465, p. 747, 2010), **David Price's** group, in collaboration with **Tahir Tahirov** and **Nigar Babayeva** at the Nebraska Medical Center, published the structure of HIV-1 Tat in complex with P-TEFb. The HIV-1 transcription factor Tat relies on the host complex P-TEFb (positive transcription elongation factor b) to produce full-length viral mRNA. The study revealed that P-TEFb undergoes significant conformational changes in order to bind Tat and suggests a specific target to block Tat binding and thereby halt HIV replication in host cells. Research Assistants **Katayoun Varzavand** and **Jeffrey Cooper** and graduate student **Stanley Sedore** from the Price lab contributed to the research.

In a highlighted *Molecular Cancer Research* paper (v. 8, p. 1017, 2010), **Marc Wold's** group molecularly characterized an allele of Rpa1, which is known to produce genomic instability and predispose to cancer in the mouse. **Cathy Hass** (graduate student) and **Lokesh Gakhar** contributed to this study.

POSTDOCTORAL ACHIEVEMENTS



George Dialynas, PhD, a postdoctoral fellow in the laboratory of **Lori Wallrath**, was awarded a competitive third year of funding from the American Heart Association (AHA). He recently completed a two-year fellowship from AHA that supported the development of a *Drosophila* model for autosomal dominant Emery-Dreifuss muscular dystrophy (AD-EDMD). His future studies will include a novel screen for drugs that correct defects caused by AD-EDMD mutations.

POSTDOC SPOTLIGHT: COMMUNITY OUTREACH

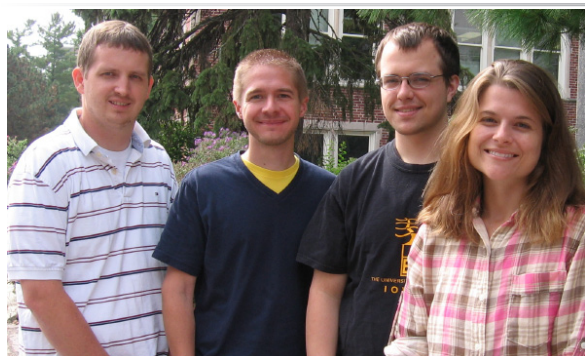
In addition to conducting research, two postdoctoral fellows and their advisors participated in science outreach events. Postdoc **Szu-Chieh "Christy" Mei** and advisor **Charlie Brenner** visited **Kevin Koepnick's** Advanced Placement biology classes at Iowa City High School on National Lab Day. Postdoc **Mike Vitalini** and advisor **Lori Wallrath** organized DNA Day for 7th graders at North Central Junior High in North Liberty.

GRADUATE STUDENT NEWS

This year, our graduate student population maintained a dynamic equilibrium:
We awarded 9 PhDs and will welcome 9 new students in the fall.

RECENT PHD GRADUATES AND CURRENT POSITIONS

Katrina Bogan (Brenner lab) - postdoctoral fellow with **Michael Welsh**, University of Iowa
Phillip Butler (Mallampalli lab)- postdoctoral fellow with **Peter Snyder**, University of Iowa
Michael Feldkamp (Shea lab)-postdoctoral fellow, **Walter Chazin**, Vanderbilt University
Bret Freudenthal (Washington lab)- postdoctoral fellow with **Sam Wilson**, NIEHS
Brian Krueger (Price lab)-postdoctoral fellow & core facility director, University of Florida
Aaron Mason (Wold lab) - postdoctoral fellow with **Brandt Eichman**, Vanderbilt University
Susan O'Donnell (Shea lab)- postdoctoral fellow with **Robert Deschenes**, University of South Florida
Belinda Pinto (Geyer lab)- postdoctoral fellow with **Terry Orr-Weaver**, Whitehead Institute
Ema Stokasimov (Rubenstein lab)- postdoctoral fellow in the Boston area, mentor TBA



Thanks to a generous endowment from **Lois Bigger Gehring**, four outstanding graduate students were recognized with the first annual **Gehringer Awards**. The winners, pictured left, were **Bret Freudenthal** (Washington lab), **Tyson Shepherd** (Fuentes lab), **Lawrence Gray** (Khademi lab), and **Susan O'Donnell** (Shea lab). Dr. Gehring earned a BA in Biology from Cornell College, a MS in microbiology from the University of Iowa, and her PhD in microbiology from Cambridge University. She is a former faculty member at University of Michigan and Eastern Michigan University.

GRADUATE STUDENT SPOTLIGHT

Several graduate students received awards: **Stanley Sedore** (Price lab), 2009 Best Doctoral Dissertation Award, sponsored by **Alap Subramanian**; **Ryan Baxley** (Geyer lab), best poster awards at the *Drosophila* Research Conference and CCOM Research Day; **Michael Feldkamp** (Shea lab), travel award for the Biophysical Society Annual Meeting; **Nicholas Bedard** (1st year medical student), Outstanding Achievement in Medical Biochemistry.

UNDERGRADUATE PROGRAMS



Honors Graduates at the Lata Symposium (L to R): Edward Cho, Martin Whitman, Alex Lagneaux, John Froehlig, and Rebecca Coe.

At the **6th Annual Gene F. Lata Undergraduate Research Symposium**, eleven senior Biochemistry Honors students presented their research projects. Most of the honors graduates will pursue advanced degrees this fall, including **Rebecca Coe** (Washington lab) and **Martin Whitman** (Shea lab), who will attend medical school at the CCOM, **Cort Lawton** (DeMali lab), who will attend medical school at U Chicago, and **John Froehlig** (Shea lab), who will attend graduate school at Johns Hopkins. Other honors graduates were **Anthony Berger** (Rubenstein lab), **Edward Cho** (Washington lab), **Ying-Kai Fu** (Elcock lab), **Alex Lagneaux** (Washington lab), **Shu Yu Liao**

(Geyer lab), **Nick Loudas** (Price lab), and **Kevin Lu** (Price lab). Currently there are 152 undergraduate Biochemistry majors enrolled in the Department.

Undergraduates from across the country came to the Department for the **Biochemistry Summer Undergraduate Research Fellowship Program (BSURF)**. Rising college seniors (pictured at right) participated in an 8-week program to gain first-hand knowledge of planning and conducting research experiments. In addition to spending time at the bench, students attended weekly seminars led by Biochemistry faculty. During the last week of the program, students showcased their research findings by presenting posters in a symposium. **Todd Washington** was the program's director this summer.



BSURF Students (L to R) Justin Kuiper, Mike Staude, Brett Waite, Aldo Vacaflores-Salinas, Danielle (Schlimmer) Herrig, Koon Yee (Arielle) Lam, Rachel Barkley, and Ashley Gaeth.

UNDERGRADUATE STUDENT SPOTLIGHT

Alexandra Keenan, a 2010 undergraduate triple major in biomedical engineering, biochemistry, and international studies, received many accolades for her humanitarian efforts. She received a 2007 Goldwater Scholarship, was named one of *Glamour* magazine's Top 10 College Women of 2009, and was just included in the *USA Today* 2010 All-USA College Academic First Team. Keenan aspires to be a physician scientist.



Photo courtesy of Tim Schoon



2010 FUTURE Participants: (Front row) Mac McLaughlin (Loras), Rachel Robson (Morningside), Molly Wernli (Wartburg), Randi Rumbold (Drake), (Back row) Stephen Brandt (Loras), Dean Paul Rothman, Shawn Ellerbroek (Wartburg), Johan Conradie (Morningside), Chinh Dao (Drake), and Madeline Shea.

Last year, **Madeline Shea** created the **FUTURE in Biomedicine Program** to match visiting professors and their students from undergraduate institutions in Iowa with University of Iowa faculty. The participants perform summer research under the guidance of our faculty. Now in its second year, the FUTURE program welcomed four new professors and undergraduate students (pictured at left). Of note, four of the seven professors that visited the university last year returned this summer to continue projects with Iowa faculty. More information on this program and its participants can be found at www.healthcare.uiowa.edu/FutureBiomedicine/

STAFF NEWS



Jan Shields and Charlie Brenner at Jan's retirement party

Janis Shields retired on July 26th after 9 1/2 years as a secretary for the Department. Jan will deeply miss the graduate and undergraduate students, remarking, "the students are the heart and soul of the university. They are my babies." Biochemistry hosted a retirement reception for Jan on July 21.



Biochemistry Administrative Staff (L to R): Karen LeVelle, Brenda Kunkel, Janis Shields, and Rosemary Stratton. Not pictured, Paul Rogers.

STAFF SPOTLIGHT

Congratulations to **Rosemary Stratton** for completing her MBA at the University of Iowa Tippie School of Management with a concentration in Management & Organizations.

MILESTONES



Alice Fulton, Professor Emerita

Alice Fulton's transition to Professor Emerita was honored with a retirement luncheon at Hearth in downtown Iowa City. Dr. Fulton has been at the University of Iowa since 1981. During her tenure here, Alice received an NSF Presidential Young Investigator Award and was an elected Fellow of the AAAS. She has mentored many students and postdocs over the years, including former undergraduate student **Susan Wentz**, now Associate Vice Chancellor for Research, Senior Associate Dean for Biomedical Sciences, and Professor of Cell & Developmental Biology at Vanderbilt University. Dr. Wentz returned to Iowa to honor Dr. Fulton at her celebration (pictured together at right).



Fulton with former trainee Susan Wentz



Bryce Plapp at his 70th birthday party

Biochemistry celebrated **Bryce Plapp's** 70th Birthday with an event at the Iowa Memorial Union. In addition to watching the Iowa-Iowa State football game, many of Dr. Plapp's former trainees gave talks: former postdocs **Frank Fan** (Group Leader, Promega Corporation), **Gretchen Shearer** (Senior Research Chemist, McCrone Associates), and **Henry Charlier** (Associate Professor, Boise State University); former graduate students **Jon Rubach** (Principal Scientist, GlaxoSmith-Kline), **Hong-Wei Sun** (Chief of Biodata Mining and Discovery, NIA-MS) and **Lori LeBrun** (Senior Scientist, Celgene). Several of Dr. Plapp's former colleagues also attended: **Arthur Arnone**, **Thomas Conway**, and **Charles Swensen**. Bryce particularly enjoyed the 35-3 Hawkeye win over Iowa State.

ALUMNI NOTES



Richard McGee, PhD

Two Biochemistry graduates were recognized as University of Iowa Distinguished Alumni. Both awardees are former PhD students of **Arthur Spector**, a tribute to Dr. Spector's mentorship. **Richard McGee, PhD**, Associate Dean for Faculty Recruitment and Professional Development at Northwestern's Feinberg School of Medicine, was chosen for his work to expand the pipeline of qualified applicants to MD, PhD, and MD/PhD programs. McGee is now conducting NIH-funded research on how to identify individuals who have "the right stuff" to succeed in research.

Bradley Hyman, MD, PhD, John B. Penney, Jr. Professor of Neurology at Harvard, directs the Alzheimer's unit of the Massachusetts General Hospital Institute for Neurodegenerative Disease. Dr. Hyman is a noted



Bradley Hyman, MD, PhD

researcher on the molecular and anatomical aspects Alzheimer's disease and dementia, who has recently discovered that caspase activation precedes and leads to neurofibrillary tangles.

Bridget Coughlin, PhD, former graduate student of **John Donelson**, was appointed Vice President of Strategic Partnerships & Programs at the Denver Museum of Nature and Science. Dr. Coughlin has been with the museum since 2005, and is also a Livingston Fellow of the Bonfils Stanton Foundation, an organization that recognizes Colorado non-profit community leaders. She served as managing editor of *PNAS* before joining the Denver Museum in 2005.



Biochemistry Department T-shirts are available for purchase in either black or gold. Models are (*back L to R*) Karen LaVelle, staff, Kelly Wilson, student assistant, and (*in front*) Katie Washington, daughter of Todd Washington. Use the order form below to order your t-shirt.

Newsletter preparation by Kristina Thiel, PhD, Scientific Editor, University of Iowa.

Detach here and return

ALUMNI: WHERE ARE YOU NOW?

Please share your latest comings and going with us!

Name _____

Current Position: _____

Email Address: _____

Address: _____

City, State, Zip: _____

Degree, Graduation Year: _____

Former Mentor: _____

Mail to:

The University of Iowa, Dept. Biochemistry 4-403 BSB,
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or email us at biochem@uiowa.edu

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Toddler sz 2, yellow with black lettering, quantity (\$10 ea.): _____

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BIOCHEMISTRY@ IOWA

The University of Iowa
Department of Biochemistry
4-403 Bowen Science Building
Iowa City IA 52242-1109

