

American Chemical Society

National Awards Nomination Packet

ACS Award for Creative Work in Synthetic Organic Chemistry:2018 for: Phil Baran

Received: 10/06/2014

Cycle Year: 3

"For pioneering work on the design and synthesis of complex natural products and their synthetic analogs"

NOMINATOR:

Dale Boger
The Scripps Research Institute
10550 N Torrey Pines Rd
La Jolla, CA 92037-1000
UNITED STATES

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Fax: (858)784-7550
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- Have you discussed this award nomination with the nominee? No

NOMINEE:

Phil Baran
The Scripps Research Institute
10550 N Torrey Pines Rd
La Jolla, CA 92037-1000
UNITED STATES

Tel: (858)720-1823
Email: pbaran@scripps.eduXXX

ACS Current Member: Yes
Years of Service: 14
Date of birth: 01/01/1977
Present Position: Professor, Darlene Shiley Chair in
Chemistry
Industry: Academia

SAFETY PROTOCOLS:

- Does the nominee employ and require good safety protocols and practices in his/her laboratory? Yes
- Prior Recipient ? Yes
- Reason? Nominee has won at least one award in the past 5
Corey Award for Outstanding Orig Contr. in Organ
Investigator:2016 in 2016

SUPPORTER 1

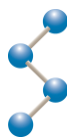
Elias Corey
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UNITED STATES

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SUPPORTER 2

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THE SCRIPPS RESEARCH INSTITUTE

Dale L. Boger, Ph.D.
Chairman, Department of Chemistry
Richard & Alice Cramer Professor of Chemistry
10550 North Torrey Pines Road, La Jolla, California 92037, USA

August 20, 2014

Selection Committee and Members

Dear Members:

Professor Baran embodies everything you could hope for in a colleague, he is a champion of science, the field of chemistry, and organic synthesis. While it is difficult to transform a mature discipline like chemistry, Professor Baran literally has done this in a very short period of time. His intellect, drive, and creativity are extraordinary, and he is one of those scientists who come along only once in a generation.

Professor Baran is the leader of his generation of organic chemists based on the creative nature, fearless approach, and sheer number of accomplishments already to his credit. The tougher the problem, the more interesting it is to Phil and one gets the sense that there is nothing that he could not do when he sets his mind to it. The range of Phil's accomplishments are legendary and include the total syntheses of the diabolically complex, biologically active natural products (+)-ingenol, palau'amine, axinellamines, massadines, ouabagenin, kapakahines, chartelline, welwithanolinones, cortistatin, haouamine, vinigrol, and stephacidin within a remarkable short time frame. These landmark accomplishments were conducted alongside his development of new synthetic methodology or synthetic strategies that provide the basis of the total synthesis approaches. Most fundamental of these accomplishments include his early oxidative enolate cross coupling reaction, methods for direct C–H oxidation, C–H arylation, transannular cyclization, and fluoroalkylation. Each of these constitute creative, bold new methods that change how we think about synthesis and strategies for making molecules. A signature contribution that has changed the way his generation may now approach a problem is best illustrated by his ongoing approach to Taxol, involving the late stage sequential hydroxylation of the unfunctionalized terpene skeleton. This has reduced the synthesis of such complex molecules to two phases, mimicking the strategy found in Nature, using a cyclase phase in which the simpler unfunctionalized carbon skeleton is first prepared and this is followed by a functionalization phase in which C–X bonds (functionalization) are introduced. Phil is now in the thick of developing the pioneering methodology that is the ground work for ongoing efforts on Taxol and was used in his recent total synthesis of (+)-ingenol. This is truly innovative science from its conception to its implementation. It has far reaching ramifications additionally for the synthesis of alkaloids, which Phil is also pioneering, and for the late stage divergent exploration of drug candidates in medicinal chemistry. It is a transformative strategy for those who make molecules and for organic synthesis.

Phil received his BS degree in Chemistry with Honors from New York University in 1997 after 3 years and at the age of 19, having progressed through his education at an accelerated pace and with a remarkable 6 publications. He received his PhD from The Scripps Research

Institute in 2001 as an NSF Fellow in a record 4 years with an astonishing 31 publications. Among these were his signature total synthesis of the naturally occurring complex CP molecules (CP-263,114, CP-225,917), which alone would be an outstanding accomplishment. Following a postdoctoral appointment with E. J. Corey at Harvard University (3 stellar publications including the total syntheses of (+)-austamide as well as okaramine) supported by a NIH Postdoctoral Fellowship, he joined the faculty at The Scripps Research Institute in 2003 where he has risen rapidly through the ranks of Associate (2006) and Full Professor (2008) to his present position as the Darlene Shiley Professor of Chemistry (2012). As a result of his accomplishments, he has been the recipient of an appropriate and remarkable series of awards including being named a 2013 MacArthur fellow ("genius" award), 2013 Mukaiyama Award (Japan), 2011 ISHC Katritzky Heterocyclic Chemistry Award, 2010 Thieme-IUPAC Prize in Synthetic Organic Chemistry, 2010 ACS Award in Pure Chemistry, 2009 Sackler Prize in the Physical Sciences, 2007 ACS National Fresenius Award, 2007 Hirata Gold Medal, 2006 Pfizer Award for Creativity in Organic Synthesis, 2006 Beckman Foundation Fellow, 2006 Alfred P. Sloan Foundation Fellow, 2006 BMS Unrestricted "Freedom to Discover" Grant, 2006 NSF CAREER Award, 2005 Eli Lilly Young Investigator Award, 2005 AstraZeneca Excellence in Chemistry Award, 2005 DuPont Young Professor Award, 2005 Roche Excellence in Chemistry Award, 2005 Amgen Young Investigator Award, 2005 Searle Scholar Award, 2005 GlaxoSmithKline Chemistry Scholar Award, and the prestigious 2003 ACS Nobel Laureate Signature Award in Chemistry.

He is not only a terrific candidate for the Aldrich Creativity in Organic Synthesis Award, but he is a most deserving recipient who will set the standard for years to come.

Sincerely,



Dale L. Boger
Chairman, Department of Chemistry and
Richard & Alice Cramer Professor of Chemistry

Curriculum Vitae

Phil S. Baran

Appointment:

The Scripps Research Institute
Department of Chemistry
10550 North Torrey Pines Road, BCC-439
La Jolla, California 92037

Telephone: (858) 784-7373
Facsimile: (858) 784-7575
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Website: www.scripps.edu/chem/baran/

January, **2013** Darlene Shiley Chair in Chemistry

April, **2009** Member, Skaggs Institute for Chemical Biology

June, **2008** Professor of Chemistry

July, **2006** Associate Professor of Chemistry (with Tenure)

June, **2003** Assistant Professor of Chemistry

Date/Place of Birth:

10 Aug 1977 / Denville, NJ, USA

Citizenship:

United States

Education

2001 – 2003

Postdoctoral Associate
Advisor: Professor E.J. Corey
Harvard University, Cambridge, Massachusetts

1997 – 2001

Ph.D. Graduate Student in Chemistry
Advisor: Professor K.C. Nicolaou
The Scripps Research Institute, La Jolla, California

1995 – 1997

B.S. with Honors in Chemistry
Advisor: Professor D.I. Schuster
New York University, New York, New York

1991 – 1995

Simultaneous high school graduation from Mt. Dora High School and
A.A. degree with honors from Lake Sumter Community College, Florida

Awards

- Mukaiyama Award, 2014
- MacArthur Fellowship, 2013
- Royal Society of Chemistry Synthetic Organic Chemistry Award, 2013
- Fellow, Royal Society of Chemistry, 2013
- Fellow, AAAS, 2012 – Present

- ACS San Diego Section Distinguished Scientist Award, 2012
- ISHC Katritzky Heterocyclic Chemistry Award, 2011
- Thieme-IUPAC Prize in Synthetic Organic Chemistry, 2010
- ACS Award in Pure Chemistry, 2010
- Raymond and Beverly Sackler Prize in the Physical Sciences, 2009
- National Fresenius Award, ACS, 2007
- Novartis Lecturer, 2007 – 2008
- Hirata Gold Medal, 2007
- Pfizer Award for Creativity in Organic Synthesis, 2006
- Beckman Foundation Fellow, 2006 – 2008
- Alfred P. Sloan Foundation Fellow, 2006 – 2008
- BMS Unrestricted “Freedom to Discover” Grant, 2006 – 2010
- NSF CAREER Award, 2006 – 2010
- Eli Lilly Young Investigator Award, 2005 – 2006
- AstraZeneca Excellence in Chemistry Award, 2005
- DuPont Young Professor Award, 2005
- Roche Excellence in Chemistry Award, 2005
- Amgen Young Investigator Award, 2005
- Searle Scholar Award, 2005
- GlaxoSmithKline Chemistry Scholar Award, 2005 – 2006

Awards (Pre- and Post-Doctoral)

- Nobel Laureate Signature Award in Chemistry, ACS, 2003
- National Institutes of Health Post-Doctoral Fellowship Award, Harvard, 2001 – 2003
- Hoffmann-La Roche Award for Excellence in Organic Chemistry, 2000
- Lesly Starr Shelton Award for Excellence in Chemistry Graduate Studies, Scripps, 2000
- National Science Foundation Pre-Doctoral Research Fellowship Award, Scripps, 1998 – 2001
- William and Sharon Bauce Family Foundation Fellowship Award, Scripps, 1997
- Dean’s Undergraduate Research Fund Award in Chemistry, NYU, 1996 – 1997
- George Granger Brown Award for Excellence in Chemistry, NYU, 1996 – 1997
- NYU College of Art and Sciences Scholarship, 1995 – 1997
- Herman and Margaret Sokol Chemistry Fellowship, NYU, 1995 – 1997

Publications >150

Patents = 4

Books = 1

Book Forewords = 4

Named and Plenary Lectureships and Visiting Professorships = ~120

Research Presentations = ~170

Professional Activities

1. NIH Study Section Member, SBC-B, 2008 – 2012
2. NIH Study Section Member, CMLD Special emphasis panel, July 2008
3. NIH Study Section Member, ad-hoc, SBC-B, June 2005
4. Scripps Graduate Student Admissions Committee, 2004 – 2011
5. Discussion Chair, GRC (Heterocycles), July 2006
6. Co-Chair, ACS Western Regional Meeting, 2007
7. Scripps Academic Advisory Committee, 2009 – Present
8. International Advisory Board of *Angewandte Chemie*, 2014 – 2018
9. Advanced Synthesis and Catalysis Academic Advisory Board, 2014 – 2018
10. Shanghai Institute of Organic Chemistry, International Evaluation Committee Member, 2013

Consulting

1. Bristol-Myers Squibb (exclusive, all sites), 2005 – present
2. DuPont, 2007 – present
3. TetraPhase (Scientific Advisory Board), 2007 – 2009
4. TEVA, 2010 – present
5. Eisai (Scientific Advisory Board), 2012 – 2015
6. Sirenas Marine Discovery (Co-founder and consultant), 2012 – present
7. Abide Therapeutics (Scientific Advisory Board), 2013 – present
8. AsymChem (Scientific Advisory Board), 2013 – present

Phil Baran, Ph.D. – List of Significant Publications

Wilde, N. C.; Isomura, M.; Mendoza, A.; Baran, P. S. Two-Phase Synthesis of (–)-Taxuyunnanine D, *J. Am. Chem. Soc.* **2014**, *136*, 4909–4912.

Jørgensen, L.; McKerrall, S. J.; Kuttruff, C. A.; Ungeheuer, F.; Felding, J.; Baran, P. S. 14-Step Synthesis of (+)-Ingenol from (+)-3-Carene, *Science* **2013**, *341*, 878–882.

Renata, H.; Zhou, Q.; Baran, P. S. Strategic Redox Relay Enables A Scalable Synthesis of Ouabagenin, A Bioactive Cardenolide, *Science* **2013**, *339*, 59–63.

Fujiwara, Y.; Dixon, J. A.; O'Hara, F.; Daa Funder, E.; Dixon, D. D.; Rodriguez, R. A.; Baxter, R. D.; Herlé, B.; Sach, N.; Collins, M. R.; Ishihara, Y.; Baran, P. S. Practical and Innate Carbon–Hydrogen Functionalization of Heterocycles, *Nature* **2012**, *492*, 95–100.

Mendoza, A.; Ishihara, Y.; Baran, P. S. Scalable Enantioselective Total Synthesis of Taxanes, *Nature Chem.* **2012**, *4*, 21–25.

Brueckl, T.; Baxter, R. D.; Ishihara, Y.; Baran, P. S. Innate and Guided C–H Functionalization Logic, *Acc. Chem. Res.* **2012**, *45*, 826–839.

Seiple, I. B.; Su, S.; Young, I. S.; Nakamura, A.; Yamaguchi, J.; Jørgensen, L.; Rodriguez, R. A.; O'Malley, D. P.; Gaich, T.; Köck, M.; Baran, P. S. Enantioselective Total Syntheses of (–)-Palau'amine, (–)-Axinellamines, and (–)-Massadines, *J. Am. Chem. Soc.* **2011**, *133*, 14710–14726.

Shi, J.; Manolikakes, G.; Yeh, C.-H.; Guerrero, C. A.; Shenvi, R. A.; Shigehisa, H.; Baran, P. S. Scalable Synthesis of Cortistatin A and Related Structures, *J. Am. Chem. Soc.* **2011**, *133*, 8014–8027.

Gaich, T.; Baran, P. S. Aiming for the Ideal Synthesis, *J. Org. Chem.* **2010**, *75*, 4657–4673.

Chen, K.; Baran, P. S. Total Synthesis of Eudesmane Terpenes by Site-Selective C–H Oxidations, *Nature* **2009**, *459*, 824–828.

Young, I. S.; Baran, P. S. Protecting Group Free Synthesis as an Opportunity for Invention, *Nature Chemistry* **2009**, *1*, 193–205.

Burns, N. Z.; Krylova, I.; Hannoush, R. N.; Baran, P. S. Scalable Total Synthesis and Biological Evaluation of Haouamine A and its Atropoisomer, *J. Am. Chem. Soc.* **2009**, *131*, 9172–9173.

Richter, J. M.; Ishihara, Y.; Masuda, T.; Whitefield, B.; Llamas, T.; Pohjakallio, A.; Baran, P. S. Enantiospecific Total Synthesis of the Hapalindoles, Fischerindoles, and Welwitindolinones via a Redox Economic Approach, *J. Am. Chem. Soc.* **2008**, *130*, 17938–17954.

Baran, P. S.; Maimone, T. J.; Richter, J. M. Total Synthesis of Marine Natural Products Without Using Protecting Groups, *Nature* **2007**, *446*, 404–408.

Baran, P. S.; Shenvi, R. A. Total Synthesis of (±)-Chartelline C, *J. Am. Chem. Soc.* **2006**, *128*, 14028–14029.

I hereby support enthusiastically the nomination of Phil Baran for the upcoming ACS Award for Creative Work in Synthetic Organic Chemistry. I know Phil very well since he was an NIH Postdoctoral Fellow in my lab at Harvard for two years. Phil is an incredibly bright, imaginative and productive synthetic organic chemist who is destined to lead his generation and go on to new heights of achievement.

Of about 700 very able chemists with whom I have had the privilege to work one on one, Phil stands out. He is very, very bright, and is able to use his powerful mind to analyze complex molecules with amazing speed and insight to design workable and unusually short syntheses. His knowledge of synthetic chemistry is vast and his energy and dedication to research are in the range exceptional to absolutely amazing. So, I consider him as number one out of the 700 - with some confidence. I might add that among the 700 are some remarkably important scientists, including two Nobel Prize winners.

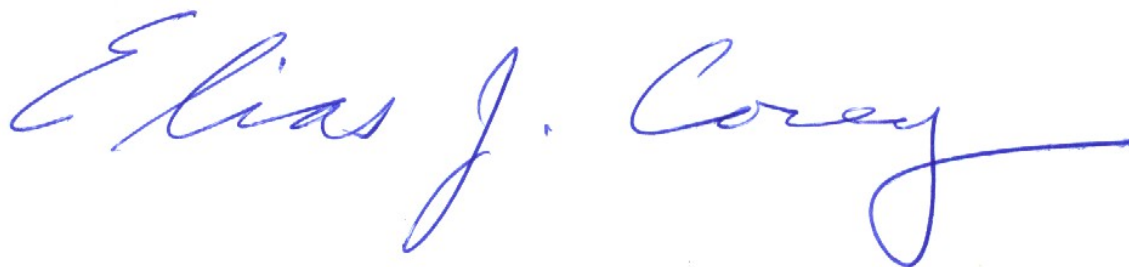
In his subsequent career Phil has established a unique personal style and a distinctive approach to synthetic research and teaching. His students are enthusiastic and hard working, knowledgeable and broadly trained. He excels as a teacher and mentor.

Phil's published independent work has set a standard for all his contemporaries (who stand in awe of his formidable prowess). I am not the least bit surprised by his success, because I could tell when he worked with me as a postdoctoral fellow that he is a rare talent, of the highest level. Despite his brilliance Phil is a modest and friendly individual and a very collegial Faculty member at Scripps.

The quality, impact and novelty of Phil's work are unsurpassed, even by the most eminent senior scientists. Regarding his potential, I am equally enthusiastic.

I have no doubt that the selection of Phil for the ACS Award for Creative Work in Synthetic Chemistry would be received with great approval. I cannot think of a more deserving candidate.

Sincerely,

A handwritten signature in blue ink that reads "Elias J. Corey". The signature is fluid and cursive, with a long horizontal stroke at the end of the name.

E J Corey
Professor Emeritus
Harvard University, Cambridge, MA 02138
Nobel Laureate (Chemistry 1990)

HARVARD UNIVERSITY

DEPARTMENT OF CHEMISTRY
AND CHEMICAL BIOLOGY

Yoshito Kishi

12 Oxford Street, Cambridge, Massachusetts 02138
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Dear Members of the Selection Committee:

It is my great pleasure to write to you in support of the nomination, made by Professor Dale Boger, of Professor Phil Baran for the ACS Award for Creative Work in Synthetic Organic Chemistry.

In only 11+ years as an independent academician, Phil has established himself as an international leader in the field of synthetic organic chemistry. I admire him for his extraordinary problem-solving power; indeed, I have no hesitation of pronouncing him as a problem-solving genius. His landmark syntheses of ingenol, cortistatin, palau'amine, and other complex natural products support my assessment. I should note that these breathtaking syntheses are coupled, in a very creative and impressive manner, with discovery/development of new synthetic methods or new synthetic strategies. To illustrate this point, I would choose the following two examples. First, his discovery on the oxidative coupling of enolates and indoles represents a remarkable advance in the field of synthetic organic chemistry. Second, his taxol work via late-stage sequential hydroxylation of the non-functionalized terpene skeleton is a bold and refreshing approach to synthesize highly functionalized complex natural products. In my view, these achievements convincingly demonstrate that Phil is possessed of the creative imagination, determination, stamina, and all of the other intangible factors required to plan and execute synthetic work at the highest level.

No one in the world in Baran's age group has such a record of achievements in the area of synthetic organic chemistry. Without doubt, this record places him in the very best throughout the world, regardless of age. I feel confident in predicting that he is *the* person to carry the flag of synthetic organic chemistry into the future. I believe Professor Phil Baran to be an ideal candidate for the ACS Award for Creative Work in Synthetic Organic Chemistry, and most enthusiastically support the nomination.

Sincerely yours,



Yoshito Kishi
Morris Loeb Professor of Chemistry, *Emeritus*