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We will start momentarily at 2pm ET



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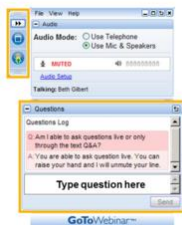
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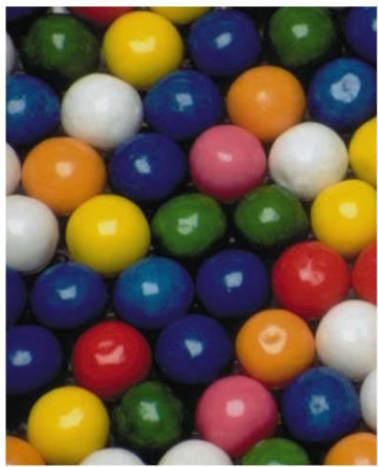
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Coming up next in Food Chemistry



The Sweetest Day and the Chemistry of Sweetness

Thursday, October 18, 2012

Join ACS webinars and ACS Education Division as we explore the Sweetest Day and the chemistry of sweetness

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Today in Chemical History

James Dewar was born on this date in 1842

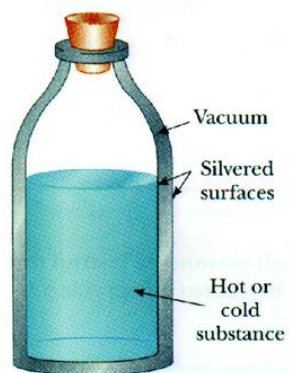


Photo from Eastern Illinois University



James Dewar
1842 - 1923

James Dewar was the first to form liquid Hydrogen and also invented the Dewar flask which lovers of hot drinks everywhere should thank him for.

James Dewar also helped invent the smokeless powder, cordite. He measured the temperature of the sun and the temperature of an electric spark. He did a lot of important early spectroscopy. He studied bubble behavior.

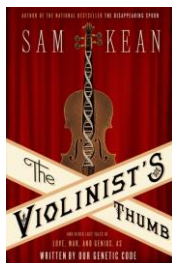
Special Thanks to the University of Houston
<http://www.uh.edu/engines/epi2519.htm>

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Upcoming ACS Webinars™

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Thursday, September 27, 2012

Genes and Geniuses: The Lost Human Story Buried in our DNA

Sam Kean, Author



Thursday, October 4, 2012

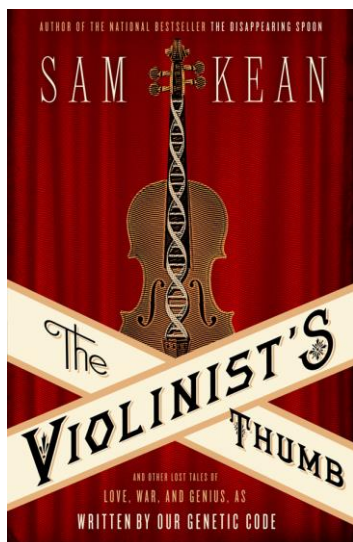
Intrapreneurs – How to Build Successful Ventures within Large Companies

Rachel Pokrandt, Beyond Benign
David Wylie, ACS Green Chemistry Institute

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Join us for our next Extreme Chemistry Webinar



November 27, 2012

Our DNA makes us who we are, but what made our DNA the way it is? Trace the history of our DNA with *New York Times* bestselling author Sam Kean as he highlights some of the subjects covered in his book, "The Violinist's Thumb." You will learn more about our DNA and its history than Mendel and his pea plants ever could have hoped for. There will also be some interesting facts about Einstein's Brain to boot.

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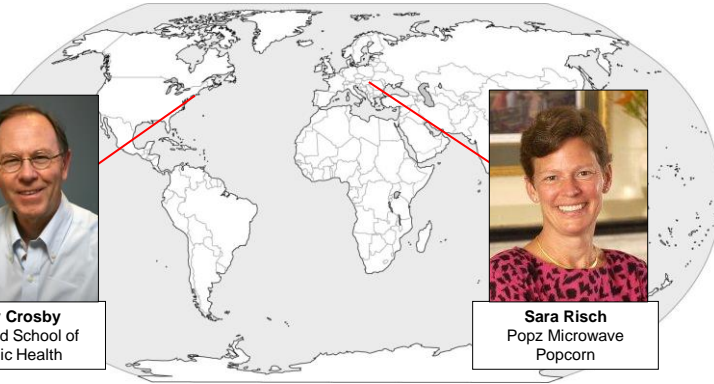
ACS WEBINARS™
September 20th, 2012



Tasty Culinary Chemistry



Guy Crosby
Harvard School of
Public Health



Sara Risch
Popz Microwave
Popcorn

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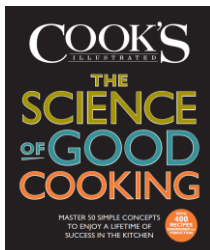
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TASTY CULINARY CHEMISTRY

Guy Crosby, Ph. D.

America's Test Kitchen
Harvard School of Public Health



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POLL QUESTION

What is the most important characteristic of food for you?

- Flavor
- Nutrition
- Texture
- Price
- Other

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FLAVOR = TASTE + SMELL

Taste is hardwired but smell is learned

The brain creates the sensation of flavor

Smell is the major contributor

G. M. Shepherd, Neurogastronomy-How the Brain Creates Flavor and Why it Matters, Columbia University Press, New York, 2012

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SOURCES OF FLAVOR IN FOOD

- Naturally Formed
- Physically Initiated
- Reaction Derived

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NATURALLY FORMED FLAVORS

Fruit flavor formed by enzymatic **oxidation**
during ripening



linolenic acid → Z-3-hexenal
β-carotene → β-ionone

Compound	Conc. (ppb)	Threshold (ppb)	Value
Z-3-hexenal	12,000	0.25	5x10 ⁴
1-penten-3-one	520	1	5x10 ²
β-ionone	4	0.007	6x10 ²
β-damascenone	1	0.002	5x10 ²

E. Baldwin, et al. HortScience, 2000, 35: 1013-1022

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ENHANCING NATURALLY FORMED FLAVORS

Cell damage increases tomato flavor

Many flavor molecules in fruits and vegetables bound to proteins and cell walls

Flavor molecules can be released by salt



Creamy Gazpacho, Cook's Illustrated, July & August 2010, pages 10-11

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Enhancing Naturally Formed Flavors

Umami = meaty, savory flavor

Interaction of glutamate + nucleotides

<u>Glutamate</u>	<u>Nucleotides</u>
Anchovies (4300)	Anchovies (300)
Parmesan (1680)	Chicken (288)
Soy sauce (1100)	Pork (262)
Tomatoes (246)	Mushrooms (100)

Build flavor with
Umami Ingredients



Farmhouse vegetable soup, Cook's Illustrated, Nov. & Dec. 2011, pages 12-13

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POLL QUESTION

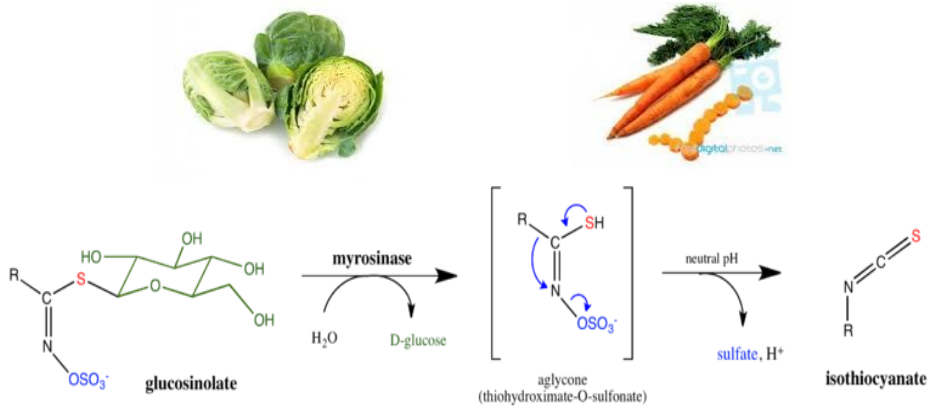
What flavor do you prefer?

- Sweet
- Sour
- Spicy
- Savory
- Other

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ENHANCING PHYSICALLY INITIATED FLAVORS

Most vegetables **form flavors within seconds of cell damage**-may vary with location (carrots)



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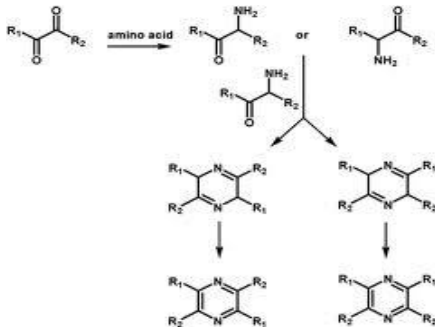
ENHANCING REACTION DERIVED FLAVORS

Maillard-Hodge Reaction

Louis-Camille Maillard (1912) + John Hodge (1953)

Reaction of amino acids with reducing sugars
produces potent flavors and browning

(roasted meat, baked bread, chocolate, coffee)



Hodge, J. *The Chemistry of Browning Reactions in Model Systems*, J. Agric. Food Chem. 1953, 1, 928-943

OPTIMIZING THE MAILLARD-HODGE REACTION

Many **cooking factors influence** the
Maillard-Hodge reaction

- Food composition
- Heating time and temperature
- Water activity
- pH range
- Catalytic effect of salts

Reineccius, G. *Flavor Chemistry and Technology*, Taylor & Francis, 2006

CONTROLLING REACTION DERIVED FLAVORS

Cooking fruits & vegetables changes flavor

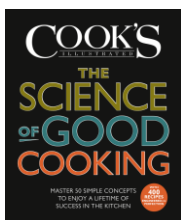
Aroma values of fresh and cooked tomatoes

Compound	Aroma Value	
	Fresh	Paste
3-hexenal	5×10^4	<30
1-penten-3-one	5×10^2	---
β -damascenone	5×10^2	6×10^3
Dimethyl sulfide	---	1.5×10^3
Methional	---	6.5×10^2
Furanones (HD2F & HD3F)	---	$1.4-2.1 \times 10^2$

J. Casey, R. Self, and T. Swain, *Nature*, 1963, No. 4909: 885.

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RESOURCES



The Editor's of America's Test Kitchen and Guy Crosby, Ph. D., *The Science of Good Cooking*, America's Test Kitchen, Brookline, MA, 2012

G. M. Shepherd, *Neurogastronomy-How the Brain Creates Flavor and Why it Matters*, Columbia University Press, 2012

H.-D. Belitz, W. Grosch, and P. Schieberle, *Food Chemistry*, 4th edition, Springer-Verlag, 2009

G. Reineccius, *Flavor Chemistry and Technology*, Taylor & Francis, 2006

S. J. Risch and C.-T. Ho, editors, *Flavor Chemistry-Industrial and Academic Research*, American Chemical Society, 2000

R. Teranishi, E. Wick, and I. Hornstein, *Flavor Chemistry: Thirty Years of Progress*, Kluwer Academic, 1999

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QUESTIONS & ANSWERS

Contact me at:

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www.cookingscienceguy.com



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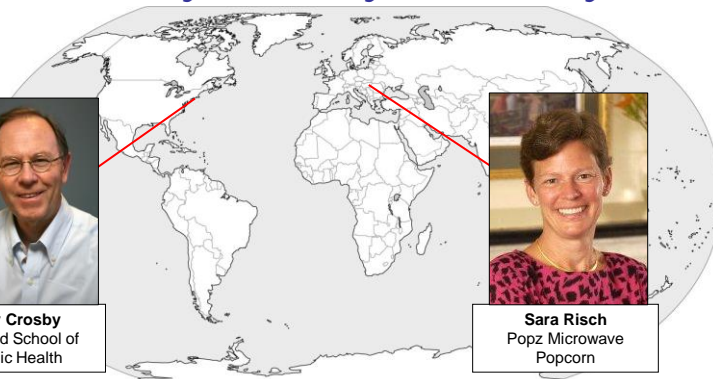
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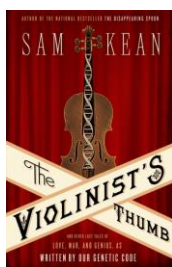
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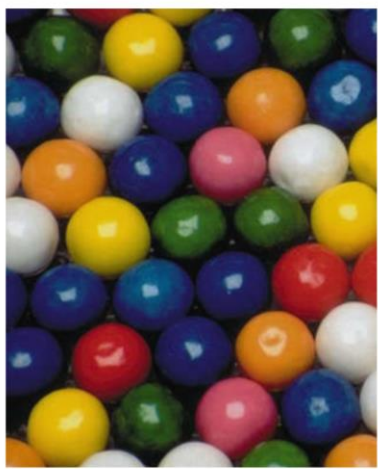
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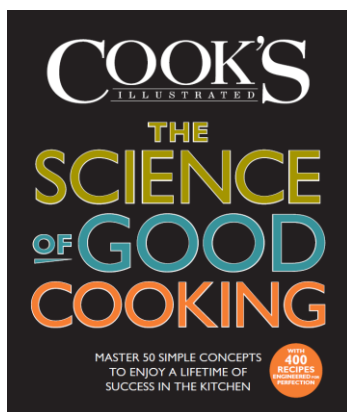
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And The Winner is...



There is still one more chance to win!

Visit www.facebook.com/acswebinars and let us know what your favorite dish to prepare is within the next 24 hours and you could be selected to win a copy of "The Science of Good Cooking"

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