

SOCIETY NEWS

THE SOCIETY OF FLAVOR CHEMISTS, INC



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President’s Message Lisa Vaughn 2017—2018

Summer Greetings all,

Hopefully, everyone is enjoying a wonderful summer!

At the end of last year our Treasurer, Mike Bloom, regrettably resigned. I would like to thank Mike for his service to our organization and wish him well. We will miss him and his efforts on the board. Sam Tharpe moved to Vice-President, Elsa Howerth was voted in as Secretary and Paul Ricciardi was voted in as Treasurer. Deborah Osborne moved to Chairperson and has also agreed to work on the hotel arrangements for all of the meetings, which will be a tremendous help to our meeting committees. Mary Foster will now be able to enjoy the meetings with little to no stress, as she moves on to handle purchasing for the Society. As President, I look forward to leading this organization of leaders in the flavor industry. It is an honor for me to serve as President and I intend to make this year a success for all the members of the Society.



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President's Message - continued

Lisa Vaughn 2017—2018

During the break, the board and committees will be planning for the upcoming year. A few dates to be aware of:

First SFC meeting- September 21 at the Hilton Newark Airport.

FlavorCon - October 24-26 at the Hyatt Regency O'Hare. The Membership Committee will be busy testing and we will be holding a short business meeting for voting purposes.

California SFC meeting-January 18, tentatively at the Los Angeles Airport Marriot. The focus of this meeting will be on proteins.

I am happy to report that the dedication and co-operation of multiple members, the syllabus has been updated and is on the website. Be sure to review, and refer your trainees and apprentices to the most current version. You will notice that several antiquated topics have been removed as the goal of the revision was to make the syllabus relevant to prepare our members for what goes on today.

I have been thinking on this question over the past several months and I would like to open a dialogue on how to engage our younger members. I am hoping to hear from anyone who has ideas. If you are interested in being part of this solution, it is a great opportunity to get involved in something that will benefit the future of the Society.

As we embark into a new year of meetings and social gatherings, it is important to acknowledge that we are a professional, dynamic group of creative thinkers, full of ideas, and driven by success. If you are not already involved, I encourage you to bring some of your work ethic to the SFC table and get in touch with a committee that you are interested in. We are always in need of volunteers!

"Individual commitment to a group effort-that is what makes a team work, a company work, a society work, a civilization work."- Vince Lombardi

I am looking forward to a fantastic year filled with meaningful and relevant meetings as well as forming new friendships.

Thank You,

Lisa Vaughn



Your 2017—2018 Society of Flavor Chemists Board of Directors!



Paul Ricciardi—Treasurer

Elsa Howerth—Secretary

Sam Tharpe— Vice President

Lisa Vaughn—President

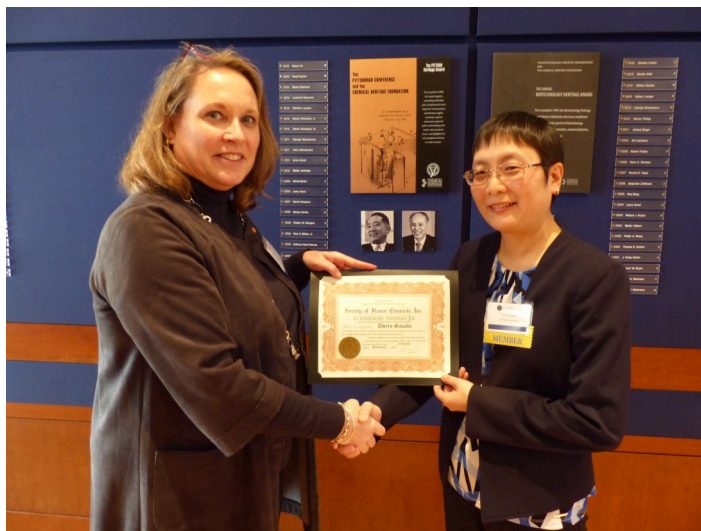
Debora Osborne—Chair

Welcome, New Members!

From the February meeting in Philadelphia

Doris Sasaki — Certified

I have been working at Gold Coast Ingredients since 2004. Here I discovered my passion for flavors, having exciting experiences in different areas from analytical to flavor creation, from sweet to savory and more recently EMCs development. I graduated from La Molina National Agrarian University in Peru with a BS degree in Food Science and continued with my PhD at Hokkaido University in Japan. I enjoy travelling, photography and cooking. I am an avid learner and love books! Mariano Gascon is my sponsor.



Jacqueline Finner — Apprentice

I live in the west suburbs of Chicago . I enjoy hanging out with my four children going to soccer games, museums and parks. I also really enjoy sewing and furniture rehabilitation as a creative outlet. I am a self-proclaimed foodie and try to eat at a new restaurant once a month. I am sponsored by Lindsay McMahon and Menzie Clark of FONA



Welcome, New Members!

From the February meeting in Philadelphia

Katie Beaver —Apprentice

My name is Katie Beaver and I went to West Chester University where I studied Forensic and Toxicology Chemistry. Shortly after graduating, I was introduced to the world of food and flavor chemistry and soon became passionate about the food and flavor industries. When not working, I enjoy travelling with my husband, baking, reading, and knitting. I am sponsored by Sam Tharpe and Steve Kudla of McCormick & Company.



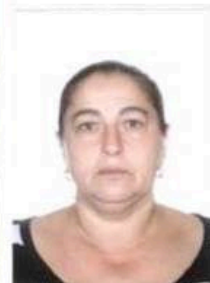
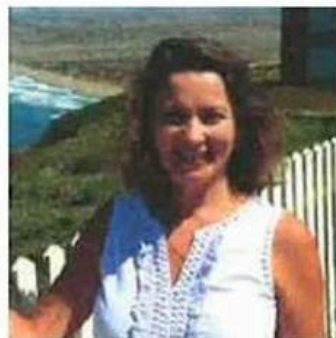
Sharon Tortola—Certified

I am Sharon Tortola. I am a Flavorist at IFF and have been with the company for eleven years. I started at IFF in the Quality Control Department, where my exposure to the amazing world of aroma chemicals and flavors began. A position opened in the Creative and Applications area for a Lab Technician, and over the last six years, I have worked my way up to Flavorist 1. I have degrees in Environmental Sciences, and have always been interested in chemistry. My hobbies and interests outside work include music, movies, travelling, and cooking.





Drew Scholle



Kimbery Bendickson

Irina Van Osdell

Marina Stoliarova



Newest Members April 2017



Irina Van Osdell—Apprentice

I have over sixteen years of experience in the flavor industry. I have a Master's Degree in Education Biology & Chemistry from Smolensk State Pedagogical University, Russia, in 1992. I completed my Flavorist Training Program at Givaudan Flavors in 2014, I am currently based in Cincinnati OH and work as a Flavorist at Givaudan Flavors focusing on flavor creation for beverages and sweet goods.

Kimberly Dickenson—Certified

I discovered my passion for flavors early on when I began organizing my social activities with friends around food and eating. I went to obtain my B.Sc. In Food Science from McGill University in Montreal, where I joined the Food Science Student Association as the Vice President for two years. After graduation, I relocated to the New York/New Jersey area to become part of the flavor industry in Kerry's Teterboro, NJ facility. Following the group's move to Beloit, WI, I have continued to engage myself in all things flavor related inside and outside of work in addition to my other pastimes such as yoga and travelling.

**Marina Stoliarova—Certified**

I have worked for Flavorcan International Inc., (formerly Flavorchem International, Inc.) for seventeen years in Canada in their laboratories and I am presently Manager of the R&D Department. I have a Master Degree in Food Engineering for the University of Moscow. I started studying to be a flavorist under Tomery Tjan of the SFC for three years starting in 1999, then under Joseph Scannali, a member of the British Society of Flavourists (BSF) for nine years. I have just been accepted by the BSF and am now a Certified Flavourist in their association. I am a Certified Food Chemists (Institute of Food Technologists). I have thirty-two years of experience in the Food Industry and hope I can share this with young chemists.

Andrew Scholle—Apprentice

I grew up and currently reside in Cincinnati, OH. My passion for flavors and food was inspired by my Italian grandmother who encouraged me as a young boy to try ingredients in her cooking. My passion developed over the years and I received an Associate's Degree in Culinary Arts from the Midwest Culinary Institute. With my degree in hand I worked in kitchens, and received my Bachelor of Culinary Science from the University of Cincinnati. I am an alumni of the Sigma Chi Fraternity. I gained vast knowledge of the food and flavor industry while working at Cargill Flavors, Flavor Systems International, and currently Givaudan.



Welcome, New Members! From the May meeting in Newark



Aparna Oak - Certified

I came here as an immigrant from India. I like to cook and try different cuisines. My hobbies include biking, hiking, and reading. I use my spare/weekend time to participate in local Indian cultural events. Bring the mother of a special needs son, I also volunteer on the special education advisory committee in my school district. Recently, I have been chosen to be on the judge panel for the World Beverage Awards 2016.

Michael Narciso— Certified

Michael was born in Livingston, New Jersey. He attended St. Benedicts Preparatory School in Newark, NJ. He then attended Providence College, where he majored in Chemistry and played on the PC Soccer team, captaining them in his Senior year. During his college years, he enjoyed two internships at Mastertaste in the sample lab and in beverage applications. After graduating from PC, he was hired by Kerry Flavors in Beloit, WI. Michael is currently on assignment in Naas, Ireland and resides in Dublin, Ireland. Michael enjoys playing soccer on a high level and enjoying Europe.





Charles Kaiser— Certified

After completing my BSc degree in Food Science at the University of Rhode Island, I began my career at a small flavor house in Pelham Manor, NY (ITC). Originally hired as an Applications Technologist, I found myself always in the compounding room, opening every bottle I could get my hands on, and starting the long & fascinating synapse-building process of associating molecules with their inherent aromas. This opened up for me the World of Flavors—and a love affair was born! I have since worked as a Flavorist for four different companies with a stint doing product development in the soft drink industry early in my career. I have always enjoyed the challenges of flavor creation work, and often times find myself explaining the discipline to people who never even knew the field existed. They are always amazed to know what a truly fun & rewarding job it is! When not in the lab working on my next creation, I enjoy outdoor activities including running, golf & fitness, as well as music and the arts, with my beautiful wife Christine and my lovely & talented daughter Caitlin.

Jagdeep Grewel—Apprentice

Hello! My name is Jagdeep Grewel and I have been working for Comax Flavors for the past eight years. My education background is a Bachelor's Degree in Food Technology from SLIET in Punjab, India. I worked at Comax for three years as a Food Technologist before deciding to become a Flavor Chemist. During the five and a half years of training, I worked with a large variety of flavors and different types of projects. I am very excited and enthusiastic about being part of the SFC in the future so I can enhance my knowledge of flavors and career.



January Meeting in Los Angeles, CA

By Sam Tharpe/Lauren Mayberry/Mariano Gascon/Louise Bone

Despite the seasonal rains, January 19th was another beautiful day in sunny Los Angeles and the LAX Marriott Airport hotel was the site for this great event that brought close to eighty attendees. The meeting started at lunch time with a presentation by the recipient of the 2016 Jogue Scholarship awarded by the SFC to Mei Song, from Oregon State University. Her presentation on her research on the “Analysis of Chiral Monoterpenes in White Wine (Pinot Grigio) by HS-SPME-MDGC-MS” was eye-opener for most of the audience. Who would have thought that chiral compounds were so distinctively different on aroma!

The following two sessions were sponsored by Chemical Sources Association (CSA). First, Jerry Horner of Horner International presented “North Carolina Terroir: Natural Flavors inspired by BBQ and Moonshine” offering samples for evaluation of various extracts available. The second session was by Toine Janssen of Isobionics who shared natural products simply made from sugar through fermentation. This fermentation process allows them to produce renewable materials that are sustainable. Some products featured were Natural Valencene, and Natural Nootkatone. They are largely available and can be supplied at a fixed price and quality.

The next portion of the afternoon was focused on California Dairy Industry from farm to table, or from agriculture origin to flavor bench, sponsored by the SFC. The first speaker was Brad Scott from Scott Brothers Dairy Farm, located in San Jacinto California. Scott walked us through his presentation titled “California Dairy A Farmer’s Perspective”. Being a family owned farm that was established in 1913, they have a clear perspective of the dairies in California. We learned that California still holds the position as the #1 milk producing state in the U.S. (about 20% of the nation’s milk), followed by Wisconsin with about 14% of the production. However, individual farms have been closing in California. In 2002, there were about 2,250 dairies in California. Last year, that figured dropped to 1,470 dairies and as of May 2016, there were 1,385 dairies in California. Specific to Southern California, there were 297 dairies in 2002 (and 268,000 milking cows). As of 2015, there were 100 (and 95,000 milking cows). We also learned about the challenges of being a dairy farmer in California and milking 1500 herd of dairy cows twice daily on a 900-acre farm. During the presentation, attendees enjoyed a sample of chocolate milk produced at the Scott Brothers Dairy Farm. A real treat!

Dr. David Everett, PhD, Director of the Dairy Innovation Institute at Cal Poly presented on “California Dairy Industry from a Manufacturing Perspective”. Everett began with the products produced from milk ranging from milk, ice cream, yogurt, cheese and butter. He explained that the diet of the cows has a big impact on the functionality of milk used in dairy products. He presented the research that he and his team are involved with to understand milk from the molecular level. He then discussed that from the molecular level the function and taste of milk is better understood for greater efficiencies in manufacturing. We were fascinated by the model mouth (including tongue) that was built at the Cal Poly SLO to study in vitro investigations under oral conditions.

Dr. Amy Lammert, also from Cal Poly’s Department of Food Science and Nutrition, presented on “The Taste of Milk”. Dr. Lammert also explained how diet can influence the flavor of the milk instantly. A herd grazing on wild garlic contaminates the milk’s flavor making it unusable to produce dairy products. Her presentation included a very interesting milk tasting session in which four differently processed milk samples were evaluated by each attendee. Unexpectedly for the audience, the flavor of lactose-free milk was noticeably sweeter than regular milk.

Concluding the afternoon was a presentation by Roger Mullins, Senior VP of R&D and COO of First Choice Ingredients, Inc. His topic “Chasing the Butterfly: A perspective on Clean Label” discussed the troubles that his company has faced. It has been a challenge for them to produce their dairy concentrates to meet the requirements of Organic and GMO verified and his company’s journey to achieve these goals. All of which are available for us to be used when creating flavors. In summation we have gone from origin to final usage or agricultural origin to flavor bench!

After a very educational meeting, the attendees closed the evening with a networking event and cocktail hour.

Photos from the California Meeting



February Meeting

Chemical Heritage Foundation, Philadelphia, PA

The Society of Flavor Chemists (SFC) celebrated the move of their collection of historic flavor books and articles to the Chemical Heritage Foundation (CHF) by meeting at CHF in Philadelphia on February 16, 2017, just a block away from the Liberty Bell. There were over 70 in attendance.

Dr. Jordy Roberts, Vice-President of the CHF, presented on the history of the CHF and its future. Roberts explained that the organization started 35 years ago by a group of University of Pennsylvania faculty with the inspiration: "The Chemical Heritage Foundation is dedicated to explaining a simple truth: science has a past and our future depends on it". The CHF has four departments: the Othmer Library of Chemical History, The Eddleman Museum, The Institute for Research, and the Beckman Center for the History of Chemistry. The Foundation also has extensive outreach to foster dialog between the public and the scientific community.

Ronald Brashear, Director of the CHF Othmer Library, described the extensive archives of the contemporary and historical chemical books and documents collection. This collection includes: documents by Lavoisier, the father of modern chemistry and illustrations by his wife, who survived her husband's execution by guillotine. There are handwritten notes by Newton when he was an alchemist. There is also an early depiction of the periodic chart by Mendeleev, and the first drawing of a buckyball. Behind its main building, the Chemical Heritage Foundation houses an archival storage facility. In the main building the reading room provides a place where the visitor can examine documents and books reserved by advance notice



February Meeting

Chemical Heritage Foundation, Philadelphia, PA

Carin Berkowitz, Director of the Beckmen Center for the History of Chemistry, presented on the history of flavor science. Berkowitz explained that Flavor chemistry took off with the development of packaged foods that were to be sold globally and needed to be shelf-stable with consistent flavor. The Beckmen Center attracts scholars from around the world who need to utilize the extensive resources available at the CHF to do support their research.

Robert Margolskee, Director and President of the Monell Chemical Senses Center, also of Philadelphia, presented on the research on taste and chemical senses being conducted at the Center. He described the discoveries on the taste of sweetness. He explained that the goal of these studies is to use the research findings to aid in the fight the global epidemics of obesity, diabetes, and cardiovascular disease.

Gary Beauchamp, Emeritus Director of Monell, presented on the use of body odor in detecting disease. Beauchamp explained that many animals give off volatile aroma compounds when sick or diseased. Monell's work involves identifying these odors and causative compounds, and developing methods for detecting them. He continues to explain that dogs have been trained to identify through sniffing, the odor of birds infected with avian flu that are part of a large flocks. Dogs have also been able to detect signs of ovarian cancer in blood plasma. Eventually it is hoped that an "electronic nose" will be developed to use for rapid diagnosis of certain diseases.



April Meeting Netherland Hotel Cincinnati OH

The April 20th Society of Flavor Chemists (SFC) meeting at the historic Cincinnati Netherlands Hotel attracted a near record (about 110) number of attendees to learn about vanilla industry, artisanal chocolate, and rum flavor chemistry.



The first presenter was Naushad “Nash” Lalani, co-founder of Sentrex Ingredients talking about “Vanilla – Flower to Flavor”. He showed us examples vanilla beans from various sources and briefly described the process for growing and extracting vanilla. He then talked about the current surge in vanilla extract. This happens cyclically, with the last surge in the 2000s due to hurricanes and political instability in the major growing region for vanilla beans: Madagascar. Prices eventually dropped in the as vanilla extract customers switched to vanilla flavor blends that reduced demand. Prices dropped so low that farmers



started to move to alternative crops.

Reduced planting and production and another hurricane caused prices to increase. However, the big change was when the large consumer food product companies, bowing to consumer pressure, started demanding “pure” vanilla extracts rather than compounded flavor blends. In the vanilla market, high prices actually lead to decrease quality of extract.

The presenter said that the extreme cycles in vanilla extract supply and pricing will continue unless changes are made. He proposed that agricultural processes such as plantation growing of vanilla beans, breeding of beans to improve yield, flavor, and disease resistance, and cooperative processing with modern technology will allow supply to meet increasing demand while improving life for the family farmers in Madagascar.

The next speaker was Paul Picton of Maverick Chocolate, a small artisanal chocolate maker in Cincinnati. His presentation was “Chocolate, from Bean to Bar”. He was a former aeronautical engineer that used to travel the world and pick up chocolate. When he retired, he needed a new source of chocolate so he started making his own. He wants to make chocolate manufacture like wine making, taking advantages of various terroir and chocolate growing regions etc. He brings in the cured beans and starts the chocolate making process with bean roasting. Most of his chocolates are only two or three ingredients, mostly dark chocolate but his best seller is a milk chocolate. He gave examples of chocolate made from beans from two regions of Peru, one from Ecuador (probably home of the original cocoa plant) and West Africa



Society of Flavor Chemists Meeting & Chemical Sources Roundtable

May 2017

The 430th Society of Flavor Chemists Meeting was held May 11, 2017 in Newark, NJ. This SFC event was particularly well attended due to the pairing of the much anticipated Chemical Sources Roundtable event. This annual event is one of the busiest and most valuable meetings offered throughout the year, rich with activity, discovery, and networking.

CSA Roundtable

The CSA Roundtable program started early morning gathering over 150 registrants of which included industry suppliers, flavor chemists, product developers, account managers, students and more. Attendees met with their choice of any of the 28+ suppliers showing off their latest and greatest ingredients. The program was organized into mini sessions where each vendor presented to tables of 8-10 attendees. Groups discussed, smelled, and tasted the best-of-the-best materials for making wonderful flavor combinations. After each session ended attendees moved on to their next supplier of choice. By the end of the program lots of samples were requested, a few raffle prizes were won, and precious time was spent learning and catching up with fellow colleagues. Thank you to the CSA and all exhibitors, your investment of time and hard work was much appreciated by all of those attending!

A list of the 28+ exhibitors and materials shown can be found on the Chemical Sources Association's website:

<http://www.chemicalsources.org/resources/Pictures/CSA%202017%20Roundtable%20Product%20Lists.pdf>

SFC Meeting

For the members meeting, flavorists took a moment of silence to reflect on those that had recently passed away:

Bill Downey, January 30, 2017

Al Saldarini, July 16, 2016

Teresa Hinrichsen, March 17, 2017

These individuals were a treasured part of the SFC family and we will hold their memories close in our hearts. We were blessed to have had them as friends and will be forever grateful for their mentorship and the talents they brought to our industry.



New Jersey Meeting (Continued)

The SFC's new officers were voted on and accepted:

Chairman: Deborah Osborne

President: Lisa Vaughn

Vice President: Sam Tharpe

Secretary: Elsa Howerth (one term)

Treasurer: Paul Ricciardi (two terms)



Congratulations to all officers! Thank you for your service and dedication to the Society!

A heartfelt moment occurred between outgoing president Deborah Osborne and Lisa Vaughn as the responsibilities passed from one dedicated member to another.

In addition to the traditional topics discussed in the meeting, a couple of exciting events were highlighted:

Flavorcon is just around the corner, October 24-26. Hope to see you in Chicago!

<http://flavorcon.com/2017/public/enter.aspx>

The 2019 SFC Symposium is October 15th & 16th.

The Society is actively looking for volunteers. Please contact Lisa Vaughn.

Dinner and Scholarship

The full day wrapped up with a lovely dinner and an impressive presentation by Geoff Dubrow, 2017 Jogue Scholarship winner. Geoff Dubrow is a PhD candidate in Food Science and Technology under the supervision of Dr. Devin Peterson at The Ohio State University. Geoff's research is focused on identifying and understanding the chemical differences between traditional and sugar-free fruit spreads with the goal of improving acceptance for the sugar-free option. In his research he uses a combination of sensory science and molecule metabolomics known as Flavoromics, which offers an exciting and modern approach to flavor research. To read more about this method of research check out the following website:

<https://frec.osu.edu/whatisflavoromics>

To read more about Geoff Dubrow's research:

<https://flavorchemists.com/jogue-scholarship-winners>

Geoff Dubrow's presentation was lively and interesting and clearly demonstrated his passion for flavors. It's almost certain that we will see more of his work in years to come! Congratulations Mr. Dubrow and thank you for sharing your learnings with the industry.

Also included in the night's events was a moment to recognize those with 25 years of SFC membership. 25 year pins were presented to the following members:

Karen Alexander

Steve Ruocco

Philp Barone, Jr.

Bernie Rutkowsky

Jean Cassidy

Patty Valente

Joan Harvey



Many congratulations to all of you who have earned this pin!

The American Spice Trade Association

This is an exciting time for the spice industry in the United States as interest in different cuisines and the spices that set them apart continues to grow, increasing demand for spices to ensure new culinary experiences.

The spice industry has a long and colorful history dating back thousands of years. The spice trade played a key role in exploration of the world as spices were sought in the far off lands where they grew. Because of the climatic conditions they require, spices continue to be grown in a wide range of countries around the world such as India, Indonesia, Vietnam, Sri Lanka, Egypt and Turkey.

Spices themselves are as varied as the countries from which they come. They are all dried parts of various plants and some examples include bark (cinnamon), roots (ginger), berries (black pepper), leaves (oregano), seeds (cumin), fruit (star anise), buds (cloves), and flowers (lavender).

The American Spice Trade Association (ASTA) was founded in 1907 in New York City following passage of the Pure Food and Drug Act to provide resources for members on how to comply with the new law. While ASTA continues to provide similar resources today on regulatory compliance, the association has grown considerably over time and expanded the resources, education and benefits that it provides for members.

The Board of Directors approved an amended Mission Statement in January 2017 to reflect the focus of the organization: ASTA works to ensure the supply of clean, safe spice, shape public policy on behalf of the global industry and advance the business interests of its members. A Vision Statement was also approved at that time: The voice of the U.S. spice industry in the global market.

ASTA's varied educational programs and resources are key to helping the organization achieve its mission.

There has been significant focus on the Food Safety Modernization Act (FSMA) in an effort to ensure our members understand the new requirements and how to meet them. ASTA partnered with the Flavor and Extract Manufacturers Association (FEMA) to provide a series of webinars as the rules were published. We also developed a FSMA Decision Tree that walks companies through a lengthy series of questions about their specific business model, with the answers then providing insight on their compliance requirements, with links to FDA information.



ASTA published two significant guidance documents in recent years. *Clean, Safe Spices* is intended to provide industry with best practices to address concerns related to filth and pathogens. Last year, ASTA published new guidance on *Identification and Prevention of Adulteration*. This document looks at how and why adulteration occurs, with an emphasis on prevention by understanding the most vulnerable points in the supply chain where adulteration can occur.

ASTA developed a webinar series available on our website on the Microbiology of Spices and will launch the follow up series this summer on Validation of Microbial Reduction Processes.

ASTA hosts two primary events for the industry each year. The Regulatory Workshop held each fall in the Washington DC area features FDA and other agency officials, as well as other insiders to provide their insight into the latest regulatory issues impacting the spice industry.

Our Annual Meeting is held each spring, with record attendance over 400 at our most recent meeting in Austin, TX. Our conference features a host of speakers covering key issues, including crop reports as well as plenty of time for networking, with buyers and sellers for major companies on hand.

ASTA meetings and many materials on our website, including white papers, are available to everyone in the industry and we would welcome readers of this newsletter to visit us at www.astaspice.org for more information.

More than 190 companies make up the American Spice Trade Association and provide the majority of spices that are marketed in the U.S. Many of



Color Flavor Interaction

Shane T McDonald

“You eat with your eyes”. What does that mean? Humans make their first judgements on food based on appearance, and confirm with taste and smell. One of the most important visual characteristics of appearance is color.

Food color is well known to affect the consumer’s perception of the flavor of the food. It affects the aesthetics, sensory characteristics, and acceptability of food. Color is a major contributor for initial acceptance/rejection of food. Early in cognitive development, one learns to associate foods with specific colors.

There have been numerous studies on how the color of food affects the perception of flavor. In a famous study by Dubose et al (1980), panelists were asked to taste and identify colored-masked samples of retail, fruit-flavored, non-carbonated beverages. Panelists did a poor job of identifying the flavors by tasting without seeing the color of the beverage. 70% of panelists correctly identified grape, but only 20% identified orange. However, when allowed to see the colors of the beverages, identification was almost 100%.

When the color of the beverage was typical for the flavor (red for cherry, green for lime, orange for orange, and colorless for flavorless), flavor identification was greatest. However, when the color was inappropriate (or incongruent, which means unexpected), flavors was often incorrectly perceived. For example, 33% of the panelist thought a red-colored lime flavored beverage was a red fruit (cherry, strawberry, raspberry). 40% thought a green-colored, flavorless beverage was lemon-lime flavor.

Other studies suggested that color can affect the perceived intensity of sweetness, the intensity of pungency perception in salsa, and the acceptability of fruit juice. All pretty amazing considering that the color doesn’t change the flavor or wholesomeness of the product.

Smell is probably the sense most difficult to verbalize (Morot et al, 2001). Humans have an excellent ability to detect and discriminate odors, but typically have great difficulty identifying specific odorants. This becomes insurmountable as the complexity of the mixture increases. Experts and trained participants who can identify single component odors with almost 100% accuracy can only identify three or four components when blended together. Unlike other senses, there is no separate language for odors; they take their name from the object that have these odors. An “odor descriptor” is the name of the object that the subject used to identify the odor.

Smell is a sense that is unlikely to provide sufficient information to generate a consciously reasoned decision, but can modify the perception constructed by the other senses. The strong influence of sight on the perception of odors illustrates the dependence of smell on more reliable information.

For example, the odors of wine tend to be associated with the colors of the wine. For the most part, red wine descriptors are represented by red or dark objects (e.g. as prune, cocoa, raspberry, and tobacco) while the white wine with yellow or clear objects (“melon”, “citrus”, “butter” and “apple”).

Color Flavor Interaction Cont'd

In the study (Morot, 2010), panelists were given two wines. One was a white wine “W” and one was a white wine dyed red “RW”. It was determined separately that the two wines were identical in taste and that the dye did not affect the flavor. Panelists tasted the two sets of wine and overwhelmingly used white wine descriptors to describe W and red wine descriptors to describe RW.

The wine’s color provided significant sensory information, which misled the subject’s ability to judge flavor. The mistake is stronger in the presence than in the absence of access to the wine color. The subjects smelled the wine, made the conscious act of odor determination and verbalized their olfactory perception by using odor descriptors. However, the sensory and cognitive processes were mostly based on wine colors.

The study concluded that the sense of smell is, by itself, unlikely to provide sufficient information to allow for a consciously reasoned decision.

Zellner (2013), presented a model, which I will attempt to summarize.

Color exerts its influence on odor identification, discrimination, intensity and pleasantness through its ability to activate an odor image and indirectly through its ability to facilitate retrieval of odors labelled from memory. So, you have a lot of odors that you have experienced and stored in memory. As mentioned above, the words used for odors are the objects that possess that aroma. Think banana, fruity, grilled, smoky, etc. So, with no visual clue, (such as a colorless liquid in a jar), upon smelling the odor you have to discover a match by sorting through a “library” of odor objects that you have experienced through life.

However, with a color clue, the mind activates olfactory “images” of all odors corresponding to the color and creates an expectation that is a fusion of all these images. Seeing a red beverage, you expect a flavor in the realm of cherry, strawberry, raspberry, cherry, tomato, etc. Also, color will help retrieve an odor label which will help in odor identification by narrowing the possible odor labels to those that have been associated with that color.

These labels will can transform the perception of the actual odor into ones that most closely resembles the odor image activated by the label, giving rise to a very strong, clear odor experience. Thus, olfactory intensity, identification, and liking of the odor will all be increased by the presence of an appropriate color.

What if an inappropriate color is used? The wrong odor images will be recalled, which are inconsistent to the aroma smelled. The subject will either be unable to find an appropriate label. This will result in the perception of a strong, unpleasant aroma. Alternatively, the aroma can be mis-identified, and the perceived odor judged as unpleasant example of the flavor, or the mind can transform to one more congruent with the color.

Conclusions

Colors, when correctly used, can increase the ability of tasters to correctly identify the odor/taste/flavor, with increased perception of intensity and acceptability. Incorrect coloring will create an expectation that is not match by the food, resulting in misidentification, and decreased acceptability. The actual effects are quite complex and are still being studied.

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