

ICATS News



Editor's Notes Deirdre Makepeace

As professionals and aspiring managers navigate through their careers, the range of issues and challenges they will encounter is becoming ever more complex. In this edition of ICATS News the academic team consider topics ranging from careers advice, sustainability, fashion and food waste to technical, scientific and regulatory matters such as agricultural residues in naturals and the EU's Green Deal.

The event reports summarise the fascinating advances and innovations across the sector and the articles often conclude with a firm recommendation to view online lectures, join the relevant trade organisations and, most importantly, to keep reading around the topics. In today's fast-paced world it does take determined motivation to allocate time for education and professional development but efforts in this regard have the potential to be rewarding as careers progress.

Our magazine often concludes with book reviews on topics related to the science and management of the sector and, in a departure from the norm, this edition includes a review of a number of resource websites with an evaluation of their depth and quality. There really is a wealth of information out there and there will always be more to learn.

Welcome to ICATS

ICATS has been providing world class distance learning for nearly 30 years. Its foundations were in the aroma trades but in 2012 the course was developed to incorporate a flavour pathway, recognising the increasing integration between the two sectors. The courses are accredited by the International Federation of Essential oils and Aroma Trades (IFEAT). From its base in Plymouth UK, ICATS runs a virtual network of academics, industry professionals and tutors supporting students around the globe as they develop their technical and managerial skills to succeed in the specialist and complex aroma and flavour industry.

Contents

About ICATS	2-3	EVENT REPORTS	
IN THE NEWS	4-7	IFEAT online event	15-17
MEET THE STUDENTS	8-9	BSP Symposium	18
CAREERS	10	BSP fine fragrance event	19-20
PEOPLE	11	BSF online lectures	21-25
Obituary Mike Boudjouk		WEBSITE REVIEWS	26-27
FEATURE	12-14	CONTACTS	28
Sustainability			

ICATS Team

From its base in the city of Plymouth, UK a core team of ICATS staff is supported by a wider virtual team to deliver a comprehensive portfolio of educational services including the Diploma Programme, workshops and continuing professional development for the aroma trades.

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IFEAT ICATS Diploma and Certificate



Barriers to international travel do not present any specific challenges to studying with ICATS. Our students work in locations across the globe. What ties them together is a desire to develop their technical and management skills, enabling them to contribute positively to business strategies and operation in these unusual times. The programme is delivered through distance learning, supported on a one-to-one basis by professional industry experts and educators.

The core qualification offered by ICATS is the masters-level Diploma but the approach to learning is completely flexible so students may find that the concise Certificate, or even selected units, may suit their needs better. Science graduates might select financial, marketing and project management whereas small

business entrepreneurs might choose the science and technical modules to develop skills for wider oversight of the business. Each unit is assessed by a work-related assignment, allowing students' roles to be reflected in the content; adding professional context with scope to tackle live workplace scenarios.

To date, nearly 150 delegates have enrolled on the programme and they come from a wide range of roles within the sector including producers, brokers, processors, compounders, manufacturers and retailers. The units are shown here with the options for specialising in the fragrance or flavour pathways.

Not sure where to start? Contact us and we can work with you to develop and individual learning plan.

Global Units:

- 1 Foundation Science and Mathematics for the Aroma Trades
- 2 Sensory Studies and Odour Taste Language
- 3 Aroma Materials of Natural and Synthetic Origin
- 6 Safety, Regulatory and Environmental Issues in the Aroma Trades
- 7 Operations, Logistics and Quality Assurance in the Aroma Trades
- 8 Business Environment and Marketing in the Aroma Trades
- 9 New Product Development in the Aroma Trades
- 10 Project Management and the Briefing Process
- 11 Financial and Management Issues in the Aroma Trades

Flavour Pathway

- 4 Flavour Creation and Evaluation
- 5 Application of Flavouring Materials in Flavoured Products

Fragrance Pathway

- 4 Fragrance Creation and Evaluation
- 5 Application of Aroma Materials in Perfumery Products



The ICATS team are attending several industry events in the coming months, both in person and virtually. Please say hello and we can tell you more about the qualifications and the learning and assessment processes.



Dr Tony Curtis

ICATS Founder and Principal Tutor

In the media the summer has often been called 'The silly season!' with slow news days resulting in stories such as 'Man bites dog!'. This is not so this summer! Here is a selection of headlines from journals on my desk today:

THE WEEK: *Halfway to boiling point:* this is a review article on impact of dangerously high record temperatures in India & Pakistan. Even in the UK a high temperature health warning was given this June. *The looming crisis: Will Russia's war unleash famine?*

New Scientist: *Can Fashion ever be green: The environmental cost of your clothing – and what you can do about it*

E&T [Monthly magazine of The Institution of Engineering & Technology]: July special edition *War on Waste* and June edition *Rethink Plastics* feature article.

What are the linking threads? The turn of the century witnessed a frenzy of globalising supply chains. A well-oiled Swiss watch precision system of giant container ships, bulk carriers and automated distribution warehouses provided ever cheaper products in abundant supply. 'Use, enjoy and chuck away!' was the mantra. Dr Ali's Green's excellent event reports reflect the Aroma Trade concerns with aspects of sustainability and supply chain management. In these turbulent times people in our industry are wrestling with supply chain challenges which are providing very real threats to the industry as we know it. There is little time for reading around. One of the aims of the ICATS Newsletter is to distil work and ideas in other industries that may be useful and to import into our Aroma Trades context. In this spirit I start with the 4th June New Scientist cover story on fashion. The heading and strapline set the dispiriting tone:

CAN FASHION REALLY GO GREEN? Our love of cheap and cheerful clothes is hugely damaging to the environment. What does more sustainable fashion look like, and what will it take to buck the trend? The [present] fashion industry has become a threat to the habitability of the planet.

Graham Lawton

We can use a 4Rs framework to assess green and sustainability issues: reduce, reuse, recycle and recover. Reducing environmental impact is a challenge. Cotton is problematic. It has high inputs such as water, agrochemicals and energy. Synthetic fibres such as Lycra® are oil based. I used Tencel™ as a case study in my teaching. It appears to be an ideal solution. It is based on plant cellulose; it uses a solvent in a closed loop system (recycle of solvent) but still the processing costs are so high that it is regarded as a luxury (it has absolutely brilliant fabric qualities) and not a mass product. There are no easy fixes, no low hanging fruit options for a wonder fabric. The New Scientist reports that the average number of times a T-shirt is worn is 30 times and only a tiny proportion of discarded clothes are recycled. Many fabrics contain mixtures of fibre (e.g cotton - polyester) and this can make recovery difficult. The whole complex international supply chain is involved. Not only is improved technology needed but consumers will have to accept higher prices. Not an easy sell when people are facing a disposable income squeeze with high inflation.

However, I am reminded of a New Scientist cartoon. It features two environmentalists taking in front of a large poster. In the first image the poster reads 'Save energy, save the planet!' and the caption is 'This is true but doesn't work!'. The second image shows the same two environmentalists but the poster now reads 'Save energy, save money!' and the caption now reads 'This may work!' Possibly reduced disposable income may make slow fashion trendy! There is a glimmer of hope on the horizon with some internet sites allowing people to trade no longer wanted clothing.

If the New Scientist is on the case, so too is E&T [Monthly magazine of UK Institution of Engineering & Technology]. The July special edition *War on Waste* and June edition have a whole series of powerful articles. The front cover of the July edition sums up the situation:

WAR ON WASTE feature articles: Exclusive: Tech tracks down the fly-tippers; The UK's packaging plan: what is the hold up? Investigation: Your plastics [UK] burned illegally abroad; Can we afford to waste 1.3 billion tonnes of food every year? The fight against fatberg.



Here I will focus on what is a mixed story but overall, it is one of hope and potential good progress to be made. First, let us have the bad news! A world where supply chain disruption is affecting the export of Ukrainian food (wheat and sunflower oil). The forecast is that this might precipitate famine in some regions. This is against a background where 1.3 billion tonnes a year of food is wasted (1/3 of total production). This is shocking in itself. However, to make matters worse the current disposal of this wasted food is estimated to generate 1.8 billion tonnes of greenhouse gas emissions, adding insult to injury or injury on top of injury?

Now here is the good news. The article on food waste is not a message of despair but one of hope. Currently engineers and scientists are working on ways to extract target carbohydrates needed to make probiotics. Reading University is the home of the IFEAT / British Society of Flavourists international flavour course. The article profiles Dr Afroditi Chatzifragkou's work at Reading. He comments that waste like potato peel is no longer considered something that is worth nothing. Possibly there is truth in the old saying 'Where there's muck there's money!'. Recently a couple of BBC World Service programmes focused on breeding and harvesting black soldier fly larvae (this sounds better than maggots) to produce high quality protein from food waste. An early target is as a replacement for non-sustainable fish meal used in the production of meat and fish farming, some good news!

The June and July editions of E&T feature three articles on packaging. *The Waste Mafia* explores the dark side of waste management: illegal waste dumping. High technology drones are just one of the high technology weapons being deployed in this war. It illustrates a key challenge. Regulation and law are a waste of time unless resources and technology are deployed for their enforcement. *Rethinking Plastics* and *The Problem with Packaging* look at the challenge of reduction and recycling. What I liked about these accounts was the exploration of the multi dimensionality of the problem. Here is one statistic. 25% of UK households classify as high performing recyclers as they only dispose of 1 to 2 items a week incorrectly (is



that good?). Depressingly 20% of households are classified as lower performing recyclers as they dispose of over 10 items a week incorrectly. Richard Hinchcliffe poses the question 'Imagine if all food trays were made of one material or if all [plastic] bottles were clear?' Recycling would be simpler and more efficient. The consensus of current Marketers is that consumers will respond to a range of more attractive offerings with more sales and more profit. The array of more brightly coloured packaging is more difficult to recycle than boring clear plastic which can be more effectively and efficiently processed.



Corporate social responsibility (companies doing the right thing, more than simply compliance) is only part of the picture. Law and its enforcement are important but again only part of the picture. In Social Marketing, Marketers identify that there are some special challenges in this aspect of marketing including:

- **Negative issues:** use less, buy less, waste less, keep longer (e.g fashion products). This is against a barrage of buy this season's model etc. messages.
- **Lack of a link between action and benefit:** Global warming may cause sea levels to rise. I live on top of a hill so why should I care? The benefit goes to others, not to me! I am 70 and sea levels will not be a problem until 50 years from now. Why should I care now?!

The idea in Social Marketing is that we have to take people through stages:

Lack of knowledge to knowledge, to action change to value change.

This process has largely been achieved in drink-driving. In most countries there are strict laws regarding driving while intoxicated. This has the overwhelming support of people; value change has been achieved. With issues such as sustainability, global warming and green issues, in general, we still have some way to go. From the figure given above some 20% of people can't even be bothered to correctly separate their recycle waste. We are short of even achieving action change and we need to get to value change!

My concern is that politicians often play to the audience (electorate) with questions along the lines of 'What is industry going to do to clean-up its act.' That is fine but industry is part of society and it is a society problem. There must be an environment where consumers and users accept that yes 'Industry must do its bit' but we must all take individual responsibility for the future of the planet. It is one world and we are all in it. Global warming, atmospheric pollution, microplastics in the sea etc. are no respecters of national borders.

Here is another seismic philosophy change. A recent BBC broadcast reported that young people did not trust politicians but did trust their influencers on TikTok. All you need to know from an unqualified person on a screen a few centimetres in size! Well CEOs and Business Strategists are not looking up TikTok but digging deep into the bowels of the university book repositories. Not for TikTok influencers but for academic writings by Accountants and Economists, possibly long retired, for what? Well, inflation accounting theory. This was last required some ½ a century ago! High inflation has nasty problems with working capital up and down the supply chain and company inventory. Costing is easy (well not so complicated!) when \$ prices are stable (they are not at the moment for energy and many commodities). Why do I say \$ prices? Well different regions have significantly varying inflation rates. The areas may have significant economic health projections. These factors result in volatile exchange rates for local currencies against the US\$ further complicating issues. International business is getting increasingly messy and risky. Financial hedging strategies work for the relatively short term and can be a costly insurance policy. Medium and long-term options are not available. Production & operations planners wish that was the only set of problems! Day-to-day operations have additional dimensions. Here are two long established business mantras:

Consumer marketing: When is a refrigerator not a refrigerator.? Answer: when it is in Chicago and the customer needs it in Miami!

Operations planning and Marketing: You can't have a 99% car! Those little microchips only weigh a few grams, take delivery of your 1.5 tonne car and we will send you the bits to allow you to drive it next year. Customers are not impressed! You can just substitute any product in this quotation. Hit a 90% sales target in sales & marketing and that is not a disaster. A 99% complete product is!

For the last ½ century the business drive has been to globalise more and more. The New Scientist review above describes a relatively simple product group: fashion clothing. Yet even here, component manufacture (fibre,



dyes etc.) and operations (design, assembly etc.) take place in various locations scattered around the world. This is, as we said at the start of the article, like a global Swiss watch. A well-oiled logistics chain stitches (sorry for the pun!) the global chains together. This week the BBC reported that Ever Ace (the largest container ship in the world) unloaded 3,267 containers at Felixstowe (largest container port in the UK) which was just a proportion of its potential total load of 23,992 containers. Just remember one standard container equals one rather large lorry! This is just great and works like magic, provided there are no port docking problems (COVID19 restrictions?) and the ship does not get stuck in the Suez Canal (or held up by other problems such as hurricanes etc.). Remember the quotation above about a refrigerator. Well, when is a container not a container? Answer: when it is needed in China to be packed for goods for Europe but is empty, stranded by disruption in Europe! Here are some other supply chain issues:

- Ever-changing complexity of international and national regulations and resulting documentation requirements.
- War risks: The Ukraine situation (affecting both production and distribution of food) is not the only one that is difficult. Remember this is not only a physical danger but a regulatory risk with the impact of sanctions having unexpected reach and impacts.
- Criminality: piracy at sea is still a significant risk. We have mentioned above illegal fly tipping and illegal burning of plastic waste.
- Weather and climate change: the Californian drought which started in December 2011 lasted 376 weeks. Remember droughts may not only be a problem for agriculture but for energy with hydro electricity production adversely affected. Oddly in some countries nuclear power is also affected. Low river levels affect the cooling systems and force operation at reduced power. Low river levels can also disrupt shipping and barge traffic. We could go, on and on: forest fires, freak snow storms, earlier and more intense heat waves etc., etc., etc. At the start of July, Japan had joined the list of countries experiencing unusual heatwaves.

The global Swiss watch supply chain is broken. There is too much grit clogging the mechanisms. The new imperative is supply chain security with new (and unexpected) sources of global supply chain disruption.

Here is my final thought for the day. In my university library there is a whole aisle devoted to Marketing and related books. There is only about one shelf devoted to buying and procurement. There are a multitude of Marketing and related degrees. Very few are in procurement. Yet in business – to – business marketing for every sale, there is a purchase (with professionals involved in the strategy and process). One of the major effects of the recent collection of crisis events is that supply chain management has moved sharply up the corporate strategy imperative table. Supply chain management is not only about sustainability and corporate social responsibility but also simple short time survival: how do we get next month's sales plan manufactured and out the door to the customer. The IFEAT / ICATS Diploma programme has a continuing professional development focus. This aims to skill people for these new challenges and complexities. Tougher and turbulent trading conditions require professionals with deeper and broader range of competencies. The family of IFEAT education programmes aims to provide this to its member companies.

In my undergraduate lecture series on International Corporate Strategy, I started with a simple PowerPoint slide:

There are three types of companies:

Those who make things happen [make sense of the environment and take action]

Those who watch things happen [watch things but do not make sense of the changes and / or take action]

Those who wonder what happened! [suddenly find their business had failed and go bankrupt]

To be in the first group the company needs high capability, well trained and educated staff. This is not a luxury but a corporate survival imperative. Do keep reading around, events taking place 10,000 miles away this week may have a major impact on your operations next week.

MEET THE STUDENTS

ICATS students are located across the globe and have very individual motivations and objectives for studying with ICATS. In this edition we introduce you to two of our students who share their experiences of studying with ICATS

Meet Mahiob Fadila, one of our current students, a multilingual fine-fragrance specialist who tells us about his role with Alard Beauty Store.

I develop fine fragrance products for private projects, after selecting essential oils for production; I take care of all the following phases until it is delivered for sales or as an obsequie in private events. A fulfilment set that begins with assisting my client with the design and the selection of the components, followed by the purchase of the selected materials, locally or imported, and involves various subcontractors such as specialized laboratories or air transport companies, because the vast majority of my products are produced in Barcelona and delivered to Dubai. Last but not least are the legal registration and certification of the product and the correspondent tests and analysis to enable it for safe human use, according to the country of origin and local market law and legislation.

The global lockdown in 2020 offered me lot of time to think about my career, and realize that I like my job, but I needed more scientific preparation to gain enough skills, for understanding better the perfume creation process, not to a level of a chemist, but enough to be able to comprehend better the production rules and related restrictions. Furthermore, I also wanted to expand my professional opportunities.

In my case, learning could be in Spanish, Catalan or English, since my German is too rusty and in Arabic and Hebrew I couldn't find any distance or online learning. ICATS website offered exactly the kind of education I was looking for, scientifically grounded models to enable me to understand the theories and nomenclatures I am surrounded with at work. And the option of achieving IFEAT certificates, on the way to the final title, encouraged me even more, because being self-employed with family and two kids limits my budget and time availability.

Going back to chemistry lessons was not easy at all, but obviously I needed it, and I took my time to repeat the readings, and recall the lessons from high school. Because neither my Bachelor's in Business Administration nor my Master's in The Internationalization of Small and Medium-Sized Enterprises had any chemistry in the program, so I was away for enough time not to remember.

It is not just the chemistry but also the overall understanding of the industry. Thus by delivering the modules report and gaining the points for the IFEAT certificate I have got to understand how perfume became an industry and the overwhelming development of perfumes, followed by its diversified applications through the decades, affected with the worlds wars and effecting



on the worlds fashion and economy. I am not sure in which order it should be, but understood how it came together.

It would have been a big advantage if I could have access to samples of the ingredients, covered by the course modules and in the text books, which are described so meticulously in such extreme that you get the feeling you smell it while reading. Therefore, I started gathering my personal samples collection and dedicating time to learn about each one of them.

I was very keen on reading carefully about ingredients contained in perfumes I use personally or included in the perfumes that I produce, a part of gaining general knowledge; it is quite useful to be able to understand the utility and the selectivity. Although, also dedicating some space and time in my calendar for learning about ingredients sources and production methods, so understanding advantages and disadvantages of synthetic and natural ingredients.

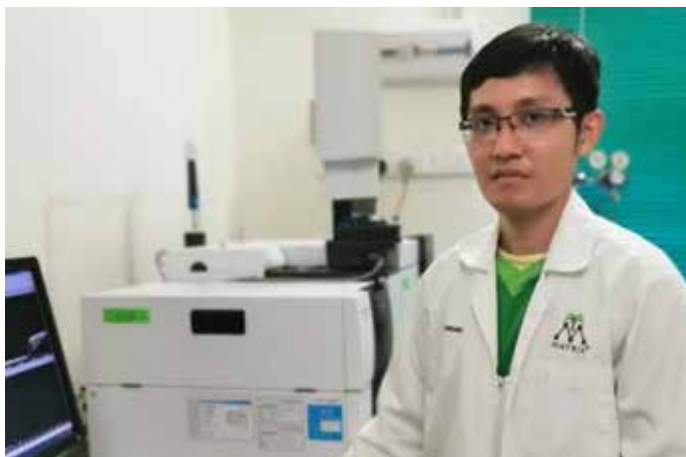
IFRA, RIFM, REXPAN... was not the most fun modules subjects to go through, but one of the most appreciated, and most reserved for continuance future consultation. Since it explains, who is who in the industry and how rules are made, so where to go in case of doubts about regulations, material toxicology report, grades or applications. And much more information, that usually is provided by the material supplier in the Material Safety Data Sheet.

I had the chance to practice by reading the reports about the safety of ButylPhenyl methylpropional (p-BMHCA) in cosmetic products, and follow the changes on the shelf products immediately, because it was banned and entered into force and application from 1 March 2022. Some products were replaced and others simply discontinued, although it is impressive to see, how strong the impact of one molecule is, on the whole industry.

Lot of curious work scenarios are justified to me now, processes that we learned and applied because the situations were predicted systematically and aimed with solutions. But after learning the course modules I gained a scientific explanation, although it provided me with new ideas for future designs.

It is not easy to spare time for learning being self-employed, so I feel lucky I could made it so far, and full of interest to continue learning, especially after trying ICATS distance learning methods.

<https://www.linkedin.com/in/mahiob-fadila/>



Meet Chong Chun Hang a flavour specialist working with Matrix Flavours and Fragrances in South East Asia

Flavouring is one of the key ingredients in food but we don't often consider that flavourings exist as a standalone ingredient. "Permitted Flavouring Substances" appear in the food ingredients list of almost every packaged food that we consume. I had totally no idea what that meant till I started working with it. I find that people around me are confused whenever I tell them about my career and an explanation is always required. During my Degree study, though "flavouring" was covered but just as a minor subject. We didn't have any idea what a flavour pyramid is – and how flavours are further separated into top note, middle note and base note.

After graduated from Food Science and Nutrition, I was introduced by R&D manager of the company that I had my internship to a flavour house that I am working to date - Matrix Flavours and Fragrances Sdn Bhd. It is the first solely owned flavour house in South East Asia. I have been offered a role of Flavourist and R&D Executive and my role is to perform the matching of customers flavour samples and also work with lab assistants in sample preparation. During flavour matching, samples will be injected into gas chromatography - to unveil flavouring substances in the flavours. Matching may seem easy but presence of substances such as captive raw materials confuse, specialty chemicals are not able to be identified and high impact chemicals are not revealed due to trace amounts. Slowly, I am to perform modification on the flavouring when there are customers request from solvent changing to profile modification.

After 3 years of working, I have been asked by my manager whether I would like to study through the distance learning course offered by ICATS Aroma Education and I started my journey towards achieving the ICATS Postgraduate Diploma. This has been quite exciting for me as I had been considering the ways I could improve my flavour knowledge and was pleased to be granted the chance to go for this course. The experience of distance learning is not always as expected. The biggest challenge in distant learning course is you have to arrange your time very well and stay motivated as it is not the same as conventional learning process where we normally attend all the scheduled courses, fulfil assigned course credit hours and submit assignments in designated timelines.

During my first 2 years, progress was pretty slow due to daily work and my inability to have good time management. Fortunately, when time dragged longer and longer, my desire to complete the course became higher and I sped up my assignment submissions. Then another challenge arose – the selection of a dissertation topic. It was hard for me to think

of an interesting topic. I initially settled on a topic working out experiments in emulsion development, but came to a dead end when I couldn't produce a satisfactory or desired outcome. As a result, I have had to change my topic. My search for another topic was hard and I even consider ending my study by just getting a diploma (without the dissertation). My tutor Peter Whipps is very helpful and has been encouraging me and suggested that I choose a topic related to what I am familiar with. With that discussion and guidance, I managed to come up with another new title.

At the beginning, my tendency to high perfectionism, jeopardized my ability to from begin any writing as I felt the need to compile all the information before writing. Most of my thoughts at the beginning lacked a clear focus and this slowed down the process. After few times of writing, without bothering too much whether idea generated is right or wrong, I was able to jot everything down and begin my first draft. Filtration of the ideas generated can be carried out at later stage and then proofreading is used filter out irrelevant ideas and removing repeated points. Also, mind the word limit (which I have breached few times). This experience will remind me to try to step out without thinking or judging too much as the process of producing a dissertation will in fact help to reach clear conclusions.

The topics in the ICATS course cover an A to Z of industry relevant topics and provide a clear picture of how aroma trades operate. I have been a Science Stream student and enthusiastic to learn more about the technicalities. However, a good product may not reach customers without proper marketing and couldn't gain huge market share if doesn't achieve what customers are looking for. After all, a good product will only be good when it satisfies and caters for their needs, as well as contributing to the brand and the company. The right product is not successful if it is not marketed in the right way. Therefore, a technical person should possess both technical and marketing knowledge.

This course definitely offers well-rounded course material, providing a full picture of aroma trades. I have no regret in study this course as it gets me to know about this industry and it provides a launch pad for me to know more about aroma trades. Despite finishing my studies, I will continue to refer back to the course materials to pick up points that I have missed. This course would be one of my "Bibles".

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CAREERS

British Society of Perfumers' Series on Careers in Perfumery

Dr Ali Green



What do we do all day and how did we get here?

The BSP have hosted an excellent series of online presentations about what it's like to work in the perfumery industry in various different positions from perfumer to sales. Given that the BSP has such a wide membership with many many years of experience within an ever-changing industry, this was an excellent opportunity to provide authoritative information to those wishing to enter the dynamic world of flavour and fragrance or those wishing to shift career from one area of the industry to another. It was also fabulous to hear about individual's often curious journeys to get to where they ended up, often having landed in the perfumery world accidentally and then falling in love with the industry.

There have been sessions on Sales jobs, Fragrance Development Managers/Evaluators, Perfumers and Independent Perfumers as well as a great session entitled *My Life as a Nose* where folk who'd been in the industry for a long time reminisced about their careers and what has changed as well as providing some excellent stories of their escapades. Most importantly, however, these perfumery greats gave some excellent advice about which three qualities they believed a perfumer should have : -

‘organoleptic approach’

Tony Dallimore (Phoenix Fragrances) said: enthusiasm, tenacity and a balance between arrogance and humility

‘enthusiasm and tenacity’

Les Small (Givaudin) said: good odour memory, patience due to the required number of experimentation and applications alongside a thick skin because you're not going to win everything

‘good odour memory’

They also offered advice to an aspiring trainee perfumer: -

Beverley Bayne (CPL): Before you smell a new raw material don't read the descriptions as it's really valuable to note your feelings/sensations/colours in a truly organoleptic way. This is an important step to developing your own style as a perfumer. Also, discuss your thoughts with others as this is a key part of the creativity process.

Roger Duprey (BBA, Quest & Givaudin): Chemistry is really helpful, particularly an understanding of organic molecules. Also, spend some time working with a homecare perfumer at some point rather than just fine fragrance to properly understand pH and perfume interaction.

All of these sessions were excellent and provided specific and invaluable information from those actually doing the job. What was clear was that nearly everyone did a considerable amount of learning on the job and often ended up in a completely different job to the one they started in. In fact Allison Dixon of PZ Cussons advised newbies in the industry to aim to move on quickly to get as broad a range of experience as possible. She began her career as a lab assistant and is now Senior Fragrance Evaluator and Perfumery Lab Manager so definitely sound advice from one who knows! It was really good to hear from several speakers who are either ICATS authors, have studied with us or have used ICATS courses as part of their company's training regime. However you get into it, and however hard and competitive some of the work is, what was apparent from everyone was the amount of pleasure they get or have derived from their jobs in our wonderful industry.

‘discuss with others’

PEOPLE

Dr Tony Curtis



Mike Boudjouk at IFEAT Cartagena 2018.
Credit: Tina Hotchin IFEAT.

ICATS Memories of Mike Boudjouk (1936 – 2022)

I first met Mike when ICATS (then the Perfumery Education Centre) moved to Plymouth from London in the early 1990's. I was immediately impressed by his vision, enthusiasm and commitment to Aroma Trades education. In a cliché-riddled world, it is often said that our future is in education. Mike was one of those rare people who not only believed this but backed it up with action and full support.

At the IFEAT Seville Conference I was able to discuss with Mike the evolving needs of the industry with the need for not only support for young professionals in the industry but graduate level education for prospective entrants into the industry. With Mike's expert guidance and enthusiastic support this resulted in the Plymouth BA Business of Perfumery and participation in the European Masters in Cosmetic Science and Perfumery (joint with ISIPCA, Padova and Plymouth Universities). His vision endures into the 21st century as the IFEAT education programme continues to evolve.

There is an old management saying 'If you want something done give it to a busy person!'. Mike was a busy person with many commitments. However, he always found time for students and education. I will

remember the 1999 IFEAT conference in Hong Kong. ICATS had two IFEAT Prize winning students. One from the distance learning course and one from the new degree pathway. What most stays in my memory is that in a hectic conference schedule Mike found time to have lunch after the presentation with the winning students. Overlooking Hong Kong harbour, this provided the young entrants to the industry with an outstanding memory to celebrate their success.

Mike never stood still and always anticipated the evolving education needs of the industry. This was fully discussed at the IFEAT Executive 2003 Sydney conference meeting when it was decided to move from undergraduate provision to a modular postgraduate programme embracing both Flavour & Fragrance pathways. Mike's enthusiastic support was vital in the immense task of developing the new course and creating the learning material. The programme was approved by the IFEAT Executive at the 2005 Cochin conference and launched at the 2008 Montreal conference.

You would think that was enough, not at all! Again, with Mike's driving force the first IFEAT Conference Workshop was launched at Montreal. Mike never did things by halves! The vibrant workshop programme for

Vancouver is a living testament to Mike's vision and support for new education ventures.

Mike will be missed by us all. However, his memory lives on in generations of past and future students with a vibrant IFEAT education programme that continues to meet the needs of the future. When times are difficult and the future appears challenging, I just ask 'What would Mike suggest we do!' His vision will live on.

His memory lives on in generations of past and future students with a vibrant IFEAT education programme that continues to meet the needs of the future.

FEATURE

Observations from the IFEAT Online Conference 2021 and the BSP/SCS event Fragrance and Sustainability with LMR/IFF

Dr Ali Green

What is sustainability and what does it look like in the Aroma Trades?

In simple terms, sustainability is living without having a detrimental effect on the environment and those who inhabit it, human, animal or plant. This is such a straightforward concept but putting it into practice is incredibly complex as soon as you delve into it, taking into account green issues, sociological aspects as well as economic factors including the all important bottom line.

The aroma trades encompasses a mixture of ingredients both naturals and synthetics (many of which are derived from natural products). These natural resources are obtained either from wild harvesting or agriculture in a global supply chain that is probably one of the most complex in any industry, incorporating numerous business-to-business transactions. These means there are not many situations where it is obvious who should be taking responsibility for which sustainability goals and footing the bill for costs incurred in doing so.

In order to examine the complexity of the situation, it's vital to understand the full flavour and fragrance value chain.

Plants

These form the basis of most aroma chemicals (natural and synthetic) and it's important to understand the journey from plant to aroma material.

- Some are wild harvested, since farming is not possible. Key issues here are whether the plant is endangered or part of a vulnerable ecosystem and how companies can trace the source of the plant and guarantee that harvesting it has not caused unsustainable damage to the environment.

- Most are farmed. Here the farming methods are under scrutiny including the effects on soil health, the use of agrochemicals (pesticides and fertilisers), general impact on the local ecosystem from deforestation, eutrophication and species diversity (particularly if large monocultures are the adopted approach) as well as harvesting strategies and any fuel used across the farming of the crop. Also under the spotlight are the welfare and working conditions of farm workers, including gender equality and child labour. Traceability is another cornerstone of any sustainability policy so any crop should be able to be tracked from planting to harvest.

Purchasing, initial processing

Here the questions are focused on who buys the produce and its initial processing.

- Initial processing in the local area - many crops need to be steam-distilled very quickly after harvest to avoid deterioration and this is often undertaken near to farms in traditional steam distillation units. The fuel used for distillation, environmental pollution and the time taken are all key questions to assess sustainability
- Initial transportation from growing area - some crops can be transported to a more central area for initial distillation or other process. How far this is from the growing area and the method of transportation and fuels used would have an impact on its sustainability



- Initial transactions - a key aspect to the sustainability agenda is fair wages for the farmer. In numerous aroma products, the farmer deals with middle men (sometimes there are a number of these) so does the farmer get a fair price or not with each of these needing to make a profit? In some areas of the world, there are cartels and corruption while in other regions, cooperatives and collectives have been set up.

Chemical processing to produce essential oils, absolutes and synthetic flavour and fragrance chemicals

- Transport of raw or semi-processed materials to manufacturing sites (proximity, fuels etc.)
- Chemical processing - how many green strategies are utilised (solvents, fuels, closed systems, greener engineering solutions etc.)? What about emissions and the carbon footprint, pollution, water and power usage?
- Welfare and wages of workers

Creative perfumery house/compounder

- Transportation and fuel usage
- Chemical processing, substitution, adaptation of formulation to fit budget and regulations
- Welfare and wages of workers

Transport to makers of end products such as cosmetics, food stuffs, homecare etc.

- Proximity & transport methods
- Wages and welfare of workers

Manufacture of end products

Very similar concerns to those mentioned above, with the addition of: -



- Packaging - use of non-recyclable items and one-shot plastics
- Marketing material

When you examine the complexity of the transactions, it is immediately apparent how challenging it is to track end products back to their origins due to the numerous business-to-business transactions in the process. It is very rare for the same company to be involved in the growing and harvesting end of things and also making aroma chemicals and end products. Where this is the case (as can be seen in LMR/IFF's Do More Good Plan) great progress can be made. However, in some of the industry, there is a good deal of secrecy to protect business concerns and there is the huge issue of a large number of farmers with small plots who are sometimes illiterate and/or do not have the resources to invest in the technology necessary for sustainable agriculture. At the last IFEAT online Conference in November there were a number of discussion panels that shed light on how achievable true sustainability in the flavour and fragrance industry actually is. It was clear from the outset that for some crops in some growing regions, it was far easier whereas in others there were serious challenges, some of which were seemingly insurmountable without a significant investment leading to a massive price hike for buyers/manufacturers and ultimately consumers. Consumers are also increasingly demanding in their buying decisions, wanting a truly sustainable product but not necessarily willing or able to pay the price, such modifications to agriculture and processing would necessitate.

Several key ingredients are wild-sourced as it's impossible to cultivate them. Eduardo Mattoso (General Director of Kaapi Ingredients, Brazil), who specialise in several wild-harvested materials stressed the secrecy that surrounds those who gather naturals like copaiba resin. The collectors are sometimes very reluctant to reveal where their lucrative gathering areas are within the forests. Some progress has been made with paperwork for products like tonka beans but they are also dealing with middle men who don't want to lose business and they can exert significant pressure to protect their business interests. Even with farmed products there is often a challenge: Mima Jacarandas (Development Department Director, Jacarandas International, Madagascar) explained the difficulty in her locality where there is only 40% literacy. Training farmers and her staff alongside investing in the necessary hardware and software would represent a substantial financial challenge for her company. In an industry where margins are often small, it is hard to see where this additional funding would come from.

Other aspects of sustainable agriculture require significant re-education in local communities and also substantial investment in new technologies, processes and entire agricultural approaches. Soil conservation, health and integrity, deforestation and the use of pesticides and fertilisers are key environmental concerns for the consumer. There have been some excellent initiatives reported in previous ICATS newsletters where larger companies have invested in sustainable farming techniques

Copaiba tree in Brazil. Locations often kept secret.



and research into GM and hydroponic systems have been environmental trailblazers. However, for a large number of farmers there are two typical scenarios: either large-scale monocultures with heavy use of pesticides, fertiliser and irrigation or incredibly small-scale agriculture with often poverty-stricken farmers using outdated equipment whilst also using chemicals with little/no education in sustainability or regulation on safety. The pharmaceutical companies providing pesticides and fertilisers have huge budgets to offer incentives to farmers and are very unlikely to highlight any potential environmental impacts and safety issues in the usage of their products. Thus eutrophication has been an increasingly problematic issue with fertiliser-rich run-offs from agricultural areas into the wild and causing drastic changes in ecosystems.

These issues all present themselves before we even get to the manufacturing and transport and the inevitable environmental cost associated with these. Please see the article on the BSF lecture from Professor Giancarlo Cravotto of Turin University on green ideas for f & f manufacturing: there are numerous excellent recommendations for good practice there in processing and extraction. However, all-too-often ideal good practice doesn't always translate into reality. In an industry with often numerous middle men and business-to-business transactions, the ultimate question is who foots the bill for such modifications in processes? In such a complex supply chain with so many people wishing to see profits, margins are often already vanishingly small

with many smaller/medium companies unable to invest in new equipment and processes. LMR/IFF were very excited to share their new green solvent extraction using a substance usually present in fruit (cassava, sugar cane and sweet potato waste products) to create absolutes such as with a new olfactive signature such as narcissus and blackcurrant bud. However, it was pointed out that the green alternative cannot do everything that solvents like dichloromethane can which is why the olfactive qualities were different; however, the new absolutes have interesting novel antioxidant properties which are not present in synthetics.

Another key issue for consumers is also the health, education and welfare of workers with schemes like Fairtrade increasingly influential on buying behaviour. With narrow profit margins across the value chain and a reliance on numerous workers in the developing world that is often difficult to monitor, how would it be possible for the F&F industry to manage this complex issue and who would fund the necessary increase in wages and better living conditions? It remains a complex situation as those in the best position to fund philanthropic enterprise are not always in direct contact with the poorest workers in the value chain due the numerous B2B transactions in a complex supply chain. In a recent BSP presentation, LMR/IFF talked about various initiatives where they are tackling this issue. In Egypt, they are supporting women to get equity in income and also funding education in first aid and nutrition for families whereas in Haiti, they are not only supporting education, they are also funding disaster relief. In general terms across IFF, they have implemented policies to aim for an injury-free workplace, no bias for gender, disability, people of colour, LGBTQ (aiming for 50% female management by 2030) and also ensuring sourcing was responsible for human rights, animal welfare and equitable and supportive value chains. It was heartening to see some steps being taken in specific regions and it looks a good model for others to follow. However, this set up only works if a company is large enough to manage everything from field to processing and would be far more challenging with for example, some of the South American commodities such

as tonka that might be wild harvested and/or travel through numerous middle men or 'coyotes' before being purchased by larger companies who might actually have the resources to fund worker investments.

The LMR/IFF talk also discussed carbon neutral production with a pledge that they would be a completely carbon neutral company by 2040 and climate positive by 2050. This does seem to be some distance away but this fact highlights the difficulties for an industry that has a huge reliance on fossil fuels for distillation plants and transportation, solvents for extraction and numerous growing and production areas in the developing world. However, as was highlighted in a recent BSF talk (writeup in this newsletter) there are ways in which the processing of naturals and synthetics can be done more quickly in a more energy efficient manner using greener technology. As the climate agreements kick in and there is a swing towards electric transportation solutions away from diesel, there does appear to be some hope on the horizon.

When we consider finished products, there has been some progress in environmental schemes with many more consumers using refill stations, choosing recyclable packaging, trying to move away from one shot plastics as well as choosing 'environmentally friendly' brands that apparently don't contain chemicals that would harm ecosystems when disposed of or washed into seas, lakes and rivers. Nevertheless, there is always a balance to be made between packaging that is appealing to a consumer, inducing a purchase, and the best thing for the environment. I know from my own experience researching personal care and household products that it's incredibly hard to make a truly informed choice as a consumer. We refill where possible, use soap in cardboard or compostable packaging instead of handwash and shower gels and purchase eco-friendly laundry and homecare products but does this really go far enough? Even compostable and cardboard packaging has a manufacturing carbon emission (often larger than the carbon footprint for manufacturing plastic items) and the refill station has a giant plastic container made of the same material we are actively told to avoid. Is it time to go back to paper, wood/cork,



A possible revival for glass milk bottles

glass, metal and pottery packaging that would have been used in the days prior to plastic and would this in fact be more environmentally friendly once we take the manufacturing of these items into account? The rise of Milk and More in the UK, a company that provide 'old school' milk delivered to your doorstep in glass bottles along with a wealth of other items that are packaged in a sustainable way, shows that some consumers are happy to pay extra for an environmentally friendly option. However, this can surely not be the case across all market sectors, particularly as the cost implications, particularly for small producers/manufacturers would be huge. What then should we do? It is an even more complex situation as the other issue to take into account is safety and shelf life. Would manufacturers be able to ensure decent shelf-life and limit oxidation and other deterioration of volatile f&f chemicals if plastic-sealed packaging were not used and would consumers and retailers accept a shorter shelf life if this was the pay-off?

I seem to have ended with more questions than answers but it is heartening to know that there are numerous engineers, sociologists, chemists and responsible businesses working to improve matters for us and the planet. What is clear is that things as they are cannot go on and something needs to be done. Whether we are in time or too late for workable solutions remains to be seen but I am hopeful the species of homo sapiens will live up to their name and find intelligent, workable solutions since it really is in everyone's interest that we do!

IFF LMR Do More Good Plan
<https://www.iff.com/responsibilities/strategy-reporting>

EVENT REPORT

Following the challenges of the last few years with a world dogged by COVID-19, the IFEAT Conference brought the industry together virtually for a celebration of the flavour and fragrance industry along with the latest and most relevant research on what really matters to those working in our wonderful business. With its theme 'Keeping the Industry Together' it certainly felt like a friendly gathering and despite not seeing each other in person, the excellent Whova platform enabled easy live attendance to sessions wherever we were in the world

Dr Ali Green

Review of the IFEAT Online Conference November 2021

After a warm welcome from Hussein Fakhry (IFEAT Chair), he highlighted current challenges to the industry (in addition to COVID) that would be discussed in panels and by eminent speakers during the conference, notably climate change, sustainability, traceability and legislative and regulatory concerns. He stressed that IFEAT is a figurehead for industry; developing relationships and partnerships with the most eminent scientific, scholarly and regulatory bodies and speaking up for all its members in crucial discussions that will shape the future for all of us. After a short presentation about the in person IFEAT Conference in Vancouver, Canada (October 2022) and the IFEAT Study Tour to South Africa (November 2022) the presentations and round table discussions began.

First up was an overview of CITES (The Convention on International Trade in Endangered Species of Wild Flora and Fauna) from Martin Hitziger who works as an Associate Plant Species Officer. After a broad description of what CITES is and who is signed up for it, Martin explained the three appendices (lists of plants) that form a basis for controls and bans on specific species (there are 38,000 plant species noted: Appendix I plants (only 390) - all trade is prohibited as they are critically endangered or in a, extremely environmentally precarious setting; Appendix II plants are permitted to be traded, but fall under specific controls

with prescriptive rules for each defined species whereas Appendix III plants have controls in some territories.. Of the 1280 MAP (medicinal and aromatic products) are several that are used for essential oils including Pau-rosa, Palo santo, Nardostachys grandiflora and Agarwood. He also mentioned that they were looking at Boswellia (frankincense) and guaiac wood which is not currently on any appendices and there is likely to be a recommendation that it be included soon. It was reassuring to see that such controls are in place to guard against species loss, but the regulations can affect livelihoods, leading to some plants being traded illegally (particularly those with medicinal properties). For more information on CITES and how it might affect your work, please visit www.CITES.org

Two of the key F&F crops were then under the microscope in the first panel discussion - Citrus and Mint: Concerns of small and large farming for the future of essential oils, in a panel discussion chaired by Dominique Roques. For each crop, production on a large industrial scale was considered alongside small scale concerns and a socio-economic overview was provided for the last 18 months or so giving a real-life account of how the pandemic has affected these two central crops. Two major mint producers Vaibhav Agrawal (Norex Flavors) and Greg Biza (RCM International) described the different approaches to



mint farming in Indian Punjab and the US. The two regions offer a massive contrast in scale, with Indian farming concerns typically comprising 1-1½ acres compared with 40 - 10,000 acres in the States. I visited some of the huge mint plantations in the Pacific Northwest on the IFEAT Study Tour a few years ago and the size of the fields was mind-blowing. Facilities in India typically have lower tech than those in the USA but are then less dependent on large amounts of fossil fuels for irrigation, transport and processing. Water has increasingly been an issue in India too, but they have done a considerable amount of work on canals and irrigation systems and Vaibhav feels that good work on sustainable practices has been done with mint farmers. In the US, however, Greg saw the biggest challenges aside from fuel costs were diseases and pests, since herbicides were routine but are now being avoided due to residues and public opposition. Increasing costs meant that some mint farmers were changing to alternative arable crops since they could get better prices for wheat and corn for less input. Two Latin American citrus producers, Manuel Suarez (San Miguel) and Sigifredo Gudiño Jr (Citrojugo) discussed lemon and lime production in Argentina and Mexico respectively and examined the pros and cons of small and large-scale farming from technology to environmental concerns as well as the complex economic and regulatory environment. All in all the discussion was lively and varied offering a spotlight on farming and production across the world to supply the aroma trades.

A major topic for essential oil producers and users was next: a panel discussion entitled Agricultural Residues in Naturals: the Scientific and Regulatory Landscape. This was chaired by IFEAT's Chief Scientific Officer Jonathan Bonello and included participants from different industry areas - John Cavallo (Citromax), Ramkumar Menon (World Spice Organisation), Hans Braeckman (Primoris) and Robert Anderson (Takasago). The use of PPPs (Plant Protection Products) has been widespread and farmers have largely been informed by the pharmaceutical firms supplying them. More recently, however, there has been a move towards natural products in end products, more sophisticated analytical equipment is able to detect residues in smaller quantities and a complex and increasingly stringent

regulatory environment is having a huge effect on farmers who are struggling to reach the same productivity without the use of chemicals. All panellists were really knowledgeable in their own fields, painting a complex picture where life was getting particularly tough for smaller producers and traders who simply can't produce sufficient quantities without the use of PPPs and also with minimal environmental impact. There was a call for a replacement for synthetic PPPs that would sit well within guidelines for sustainable and regenerative farming. In addition, the fact that bans often came into place with little/no notice was highlighted and the need for industry advocacy was stressed. What could have been a very dry subject was really livened up in this excellent and pertinent discussion.

The first day finished with a Green Chemistry presentation by Dr John Warner. For a detailed overview of the issues and solutions in this fascinating and innovative area, please see the previous edition of ICATS News.

The second day kicked off with the topical issue of Traceability: Market Expectations and Business Reality. Where do we Stand? This was chaired by Geemon Korah (Mane Kancor) and Dominique Rocques (Firmenich) with six panellists representing traders across the value chain Nico Laubscher (Eucaforest), Gillian Blemann (Berjé), Tim Valentiner (doTERRA), MiMa Jacarandas (Jacarandas), Eduardo Mattoso (Kaapi Ingredients) and Stephane Zwaans (Takasago). This session was followed by another excellent panel discussion in a similar vein: The Future of Sustainable Natural Products and Biotechnology, Expectations and Reality moderated by Alain Frix (Allchemix) with panellists Guillaume Meunier (Solvay), Maria Julia Oliva (UEBT), David Brocklehurst (Alpha Santanol), Prasobh Prasad (Mane Kancor) and Philip Kuruvilla (Indian National Sustainable Spice Programme). Both panels provided honest opinions about the reality for the producers and those later in the value chain and clearly demonstrated what a complex situation we are in. Doing the 'right thing' is not always possible, affordable and almost always not easy in an industry with such a complex value chain. For a more detailed discussion of the issues raised in these two panels see the article on sustainability in this edition of ICATS News.



After all of the complexity of the sustainability debate, it was time to immerse ourselves in just one crop - Cardamom - with a comprehensive profile presented first by two producers from the key areas of production for this vital F&F ingredient: Guatemala (Elisa Aragon of Nelixia) and India (Mithun Chakravarthy Rajamannar (Cardamom products)). They produced some really informative videos and presentations giving lots of data about how cardamom's botany, how it is farmed, stored and processed into oil. Following this, flavourist and ICATS author John Wright and Jill Costa (Lebermuth) discussed the different flavour and fragrance profiles of cardamom according to its geographic origin and its end uses. IFEAT are producing a socio-economic report on cardamom oil which will be available on their website which already features a number of raw materials here <https://ifeat.org/socio-economic-reports/>. This session formed the first instalment of IFEAT's Online Learning Service, part of the planned expansion of its Educational Programme. More on this exciting venture will be announced later this year.

The last subject to be addressed in this far-reaching conference is one of great interest and concern to those in the industry - an overview of the EU Chemicals Strategy for Sustainability - a Paradigm Shift in EU Chemicals Management given by Sylvie Lemoine of CEFIC, 'the voice of the Chemical Industry in Europe'. This comprehensive presentation clearly explained how the Green Deal (a massive EU initiative), in particular how the 'Zero Pollution' pillar of this massive policy would affect chemical legislation not only causing challenges, but also providing opportunities for businesses within this framework. This new approach moves from a risk-based to a hazard-based basis, which without some nuance that takes consideration of consumer use (not only the context of the product's use such as household or cosmetic but also how such products might be disposed of) could make the fragrance and flavour industry's life very challenging indeed. Mixtures are a particular concern as there is mitigation for unwitting combinations of chemicals that could potentially get into the environment. There is a recommendation that the most harmful should be phased out for non-essential use regardless of whether typical use and quantities within products would actually cause serious problems; with many F&F products deemed 'luxuries' this could be a massive issue for the aroma trades. More information on CEFIC's policies about the Green Deal can be found here: https://cefic.org/policy-matters/chemical-industry-green-deal/?utm_source=IW&utm_medium=newsletter&utm_campaign=IW&utm_id=CEFIC

From specific crop reports and insights, to the nitty gritty of regulations as well as more philosophical ideas such as sustainability and green chemistry, this conference had something of interest to everyone with an interest in the aroma trades. Thank you so much to IFEAT for organising such a relevant, informative and enjoyable event. I can't wait to see everyone in person at the 2022 Vancouver event in October!

VALUE CHAIN



Cardamom plant (*Elettaria cardamomum*): rootstock sprouting leafy and flowering stems, and separate flower. Coloured lithograph after M. A. Burnett, c. 1847. Wellcome Collection.

EVENT REPORT

British Society Of Perfumers Annual One Day Symposium 12th May 2022

Peter Whipps



The event was held as usual at Whittlebury Hall hotel and followed the same format as previous events although due to Covid the symposium has not taken place since 2019.

Five companies presented new materials this year, Ventos, BASF, Synarome, Firmenich and Capua. Approximately 120 delegates attended the event and as usual they were split into three groups to attend the presentations with each group having one networking session in the lounge area. Some ICATS material was made available in the lounge area for delegates to review and I was on had during the breaks to answer any questions about the course.

The day started with a lecture by Duncan Boak of Fifth Sense which is a charity set up by Duncan to support people who have lost their sense of smell. It was a very interesting and thought-provoking lecture which highlighted the problems people face when they have no sense of smell, for example they cannot detect escaping gas from an appliance which has been accidentally left on.

Directly after the lecture IFF presented a new molecule to the complete group of delegates. Veraspice was presented using a video link to two perfumers, one in the US and the other in the Netherlands. The material was demonstrated in two fine fragrance accords and then shown as the neat material.

The delegates then split into their three groups to attend the presentations by the five individual companies:

Ventos

Ventos presented a mixture of natural and synthetic ingredients including three essential oils; cypress, cardamom and pink pepper. They also represent other companies and showed Dihydrorosan from BASF and also a new molecule from Prodasynt. They are also agents for Firmenich who demonstrated five interesting materials, three synthetics and two naturals:

Muguissimo™ – Lilial type replacement material

Sylvamber™ – woody/Iso E super type Z11 HD – musk material

Rose Damascena Firad – natural rose produced by a new low carbon footprint process.

Vanilla Planifolia Mada Infusion P2F – vanilla extract made by a new proprietary process.

BASF/Isobionics

BASF presented two materials, Velberry™ (2,2 dimethylpropane-1,3-diol acetate which is a fruity aroma chemical and Santalol which is made by Isobionics, now a part of BASF. Santalol is a natural ingredient made a fermentation process and represents the heart note of sandalwood oil. BASF also presented their current green initiatives for the future manufacture of their aroma chemical range.

Synarome

Synarome are now part of Sozio and have been manufacturing aroma chemicals for more than 95 years. They presented five materials in a series of demonstration accords:

Scentolide – a musk chemical
Tea extract
Heliotropin diethyl acetal
Rhodinol – from geranium oil
Algenone – a marine type base.

IFF

The IFF presentation followed on from the one in the morning with more demos and accords for Veraspice which is a versatile spicy, floral, herbal aroma chemical which is effective in a wide variety of applications.

Capua

The presentation started with a brief introduction about the company and where their main sites are located in Italy. They presented ten materials made by their NatProfile Technology process three of which are extracted from centrifuge waters:

Rose water NatProfile®
Neroli water NatProfile®
Cucumber NatProfile®
Honey NatProfile®
Licorice NatProfile®
Licorice NatProfile® conc
Blue camomile NatProfile®
Mandarin peel water conc
Lemon peel water conc
Bergamot NatProfile® peel water.

Summary

The symposium was very well attended and it was great to see so many people from the industry again in person. In general, the standard of presentations was high and credit must go to Graham Bott of the BSP Council for organising the event at short notice.

BSP Fine Fragrance
Event 2021
Dr Ali Green



Virginie Daniau of Parfum Parfait

The British Society of Perfumers' evening session on Fine Fragrance Trends is always a 'hot ticket' event that sells out quickly. This year it was both an in-person session and also an online one and I joined the online audience from our base in the far South West of the UK. It was a shame not to be able to share the sensory experience, smelling each fragrance alongside Virginie Daniau's lively discussion, but her enthusiasm and precise odour note description more than made up for being physically present.

Virginie, with her many years of experience in fine fragrances, is a true expert in analysing the numerous releases and distilling a mass of information down to a few key trends very clearly explained and illustrated with new fine fragrances. Despite thinning out the perfumes to those she felt truly encapsulated what is happening in fine fragrance in 2022 the session was jam-packed from start to finish with fabulous fragrances, all described with passion, humour and expertise.

The discussion was split into three main sections: mixed gender, female and male fragrances. As usual, the offering for unisex perfumes provided a number of really interesting new releases, many with fascinating creative stories and concepts behind them. Virginie identified fragrance trends of fresh citrus aromatic "with white floral accents and soft musks",

numerous floral releases with "opulent tonalities" and woody fragrances enriched with the ongoing trend for suede leather and musks to provide "texture". Some fragrances look to the past for inspiration like Chanel Le Lion, created by Olivier Polge, representing the astrological symbol of Gabrielle Chanel, a totemic animal for her, representing its romance, strength and power without being overpowering or animalic. Whereas others appear more futuristic, like Paco Rabanne's Blossom Me (created by Firminich perfumer Marie Salamagne) in its soft gel bottle, aimed at a young and fashionable crowd, the fragrance sketched out as "dialled up" and "artificial, supermodern"; despite sounding pretty full on, Virginie considers it to be "comforting and cocooning" (a recurring theme this year) in essence, with the musky element offering the user a sensory solace from the world around them. Another compelling concept was that behind Arquite Vacation (Givaudin perfumer Albert Flores-Roux), another comforting fragrance, this one nostalgic for the scent of childhood holidays and the liberal application of suntan lotion in the 1980s. I'm not sure I can altogether identify due to my teenage recollections of rainy and misty trips to the British seaside or moors, however, this creamy white floral with a hot fabric dry down sounds like it would make you feel as if you were cuddled up in a fluffy beach towel. My favourite

of Virginie's descriptors from the mixed gender fragrances is that from Diptyque *Eau Rihla* (Fabrice Pellegrin) which she considers creamier and warmer than previous offerings with a pink peppercorn top note that brings a slightly sweet aspect to the fragrance, in addition, there is a "smoky handbag effect" (presumably from cedarwood and leather) - definitely not a sensory picture I've encountered previously!

Moving on to perfumes for women, Virginie notes the big trend for florals: "The new feminine fragrance launches have overtones of positivity - designed to uplift the mood and mind including notes to refresh, dazzle and engage the senses" with "nostalgia, reassurance and femininity". She divided her selection of new releases into three sections: fruity/gourmand florals, musky white florals and finishing with a floral aquatic musk

There is a good deal of innovation in fragrance this year but Virginie observes it is often coupled with a nostalgic element. A good example of this is the 'on trend' Miu Miu *Serial Player* (Givaudin Daniela Roche Andrier) a cool EDT from the *Les Eaux a la Mode* range aimed at a teen market where buyers are encouraged to wear fragrance that suits your mood (encouraging purchases across the range). Users can customise the bottles, which adds to the teen appeal, in addition to a cool fragrance with a retro aldehydic feel and white flower/musk combo that is both comforting



and edgy. For a slightly more mature market, Virginie highlights the most nurturing and cocooning of the new female fragrances: Narciso Rodriguez *Musc Noir* (Givaudin Sonia Constant), which she describes as having an “almost cashmere” and creamy effect in dry down, “a hug in a fragrance” with rum cocktail notes. Another fragrance that encapsulates the nostalgia trend is from a range of reimagined fragrances originally conceived in 2009, the Reinvention of Parfums de Marly, *Delina la Rosee* (Givaudin Quentin Bisch). This is a new edition of a fragrance inspired by the 18th century Palace de Marly, private residence of Louis XV; the two horses on the packaging reflect the two horses that were originally at the garden’s entrance and are now in the Louvre. The new release is a lighter version than the original, with airy transparent notes, soft fruits and a soft musk in the dry down; again, this is a hugely comforting and reassuring floral fragrance that retains a light touch.

Last but not least, the presentation turned to fragrances for men with the trends outlined as “‘Reassuringly’ masculine and modern; with fresh citrus top notes, long lasting drydowns, rich woods and leather notes, plus generous gourmand tonalities”. Again, new releases were categorised into three broad areas that encapsulate what is in fashion: citrus, aromatic/fougere and woods.

The trend for nostalgia continues here with reinvention of past fragrances such as Dolce & Gabbana’s *Light Blue Forever Pour Homme* (Givaudin Shyamala Maisondieu) which Virginie describes as having an overwhelming fresh grapefruit top note with a “long-lasting sulphurous fruitiness” that is really on trend. In the original version, there was a distinct amber note in the dry down, but it’s now only there in support of the warm vetiver and light patchouli which now prevail.

Most innovation can be found in the aromatic/fougere categories such as Hermes, *24 Fragrance Families: Aromatic Green Woods* (Christine Nagel - in-house at Hermes). The first new feature is the packaging, which is designed to be really sustainable with a refillable bottle and recycled cardboard outer. The fragrance demonstrates an interesting approach to the combination of natural ingredients with synthetics: clary sage absolute, which gives an animalic, tobacco note and the clary sage essential oil, offering a fresher aspect to the note form the basis of this interesting fragrance. Extra tobacco notes are added by the narcissus absolute which has been combined with an unknown ingredient to create an unusual accord which it dries down to give a hot fabric smell that is very on trend “like a freshly ironed shirt”.

A completely new approach was adopted in Paco Rabanne’s *Phantom*

(Anne Flipo, Dominique Ropion, Loc Dong and Juliette Karagueuzoglou of IFF). The fragrance was created using AI and a neuroscientific approach. Brain scans of 18-35 year-old men were taken (apparently 45 million of them!) to identify which parts of the brain are activated when smelling the fragrance whilst adding gradually increasing quantities of styrallyl acetate (a gardenia clean green note aroma chemical) to see how much produces the greatest alertness level. This approach means there is ten times the level normally seen within typical fragrances and provides an ‘energetic green opening’ for *Phantom* that becomes more gustative over time leading to some gourmand notes. *Phantom*’s promotion highlights that despite the AI approach, it stimulates sexiness, self-confidence and energy and the bottle is in the shape of a robot, reflecting the scientific approach along with an app to complete the AI package. Despite what could be thought of as a dehumanised product due to its AI nature, Virginie characterises the fragrance as ‘comforting with a gustative element’, which chimes really well with many of the other fragrances highlighted.

This event is to be highly recommended for the extremely thorough research and perfumery expertise showcased by Virginie. I really look forward to this year’s event in the Autumn!

EVENT REPORT

Dr Ali Green

A taste of online lectures from the British Society of Flavourists



I heartily recommend the excellent lectures that are on offer from the British Society of Flavourists. They are not only scholarly and feature the latest research, but they are also accessible and delivered in a lively way by academics and professionals at the top of their very specialist fields.

Professor Giancarlo Cravotto from the University of Turin's Dipartimento di Scienza e Tecnologia del Farmaco provided a whistle stop tour of the latest research and trials his team have undertaken in order to pioneer greener extraction processes in the flavour industry. Focusing on strategies that are closed loop or are far more energy efficient, he put a number of potential strategies forward. The team at Turin have first looked at what could be done to improve processes, acquired the necessary technical knowledge and then built small-scale processing units in the lab to assess feasibility and then worked on prototypes to develop the technology so it can be used industrially. Once the prototypes have been tested, the scaling up of the process is worked on so that it can be a commercially viable option.

One area of research was microwave-assisted hydrodistillation in the extraction of hop terpenes. Microwave technology could be used in the extraction and filtration processes to reduce the energy needed and the

time taken for the process. It has been used with SC-H₂O for extraction processing, using higher power density (1.5KW, High temperature of 300°C, high pressure of 200 bar with three gas inlets and fast heating and cooling with the additional use of a chiller).

Another technique that has been worked on is using pulsed electrical fields (PEFs) as a non-thermal technology to effect cell wall electroporation. If liquid foods are placed between two electrodes and pulses of high voltage applied (typically 20kV/cm up to 70kV/cm) are applied, this breaks the cellulose wall and the cell contents will be released into the aqueous solution. This reduces the energy needed for the process as heating is no longer required. Ultrasound is another technology that is being explored. It is being used in the extraction of caffeine from green coffee beans in conjunction with supercritical CO₂ extraction and an ultrasonic flow reactor.

Mechanical innovation has been made through the use of high-shear homogenisers and hydrodynamic cavitation to treat fruit pulp in the extraction process, separating out squeezed solid residue and liquid extracts. This uses counter-current hydrodynamic cavitation – a multirotor-multistator configuration where one or more discs of suitable geometry move alternately whilst connected to



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a motor shaft that rotates within a confined chamber. This generates high friction with the fluid that they come into contact with creating cavitation and separating solids and liquids in a very efficient manner far more quickly and using less energy than other methods.

In this short article, I have only skated over the details of these exciting innovations briefly but there are numerous published papers from the Turin team that provide details of their research for any in industry interested in pursuing a greener process in flavour production.

In a double event, two more eminent speakers discussed their latest research providing hitherto unseen material in the exciting world of artificial intelligence and flavours. In previous newsletters, I have examined the notion of *sensomics* in the analysis of flavours and fragrance. In a fascinating lecture, Dr Peter Schieberle, Emeritus Professor of Food Chemistry at the Faculty of Chemistry, Technical University Munich, shared his team's research into how *sensomics* can be used as a tool to elucidate the importance of single food constituents in genuine food aromas. The goal with this research was to isolate specific compounds that were involved in the pleasure perceived from food aromas and to answer the question – does a single aroma molecule have an influence on perception and behaviour? After a brief excursion into human biology to explain how and where flavours are perceived, Peter explained that aroma compounds are effectively detected by the same G-protein pairs that are used for hormones and drugs and given that between 20,000 and 23,000 protein coding genes were found in the human genome, it must be considered important for our life and health. When it comes to food preference, 87% of consumers choose according to taste and aroma so it would be really helpful to isolate which chemicals drive these choices that are apparently hard-wired in the majority of humans.

The challenge is that there are more than 11,000 volatile chemicals in foods, however, molecular structure isn't an indicator of similarity in flavour/aroma or intensity. For example, if we compare 2-ethyl-3, 6-dimethyl-pyrazine and 2-ethyl-3, 5-dimethyl-pyrazine and their relative

intensities: 3.6 ng/L air & 8.6 µg/L water and 0.01 ng/L air & 0.04 µg/L water, we can see that difference in only one methyl group increases the odour threshold by a factor of 200-300. Another complication if using experts in smelling is that as soon as there are more than five odorants, it is almost impossible for even the most highly trained to break down an aroma into its component parts since, like vision, smell is a constructive sense where the brain uses configural processing. The *sensomics* process was created to address this and attempts to break any aroma into single different odorant/receptor responses after which a recombination will be done to verify the hypothesis.

Peter outlined the workflow for a *sensomics* approach: -

1. Isolation of volatiles
2. Screening: GC/O, AEDA (aroma extraction dilution analysis – where you sniff until no compound is detected)
 - a. Cold on column injector
 - b. FID
 - c. More than 11,000 volatile sniffing port
3. Structure elucidation: (RI, odour, MS, NMR)
 - a. Aroma compounds are measured against reference compounds
4. Quantitation: SIDA (using stable isotope dilution analysis)
 - a. Homogenisation
 - b. Work up
 - c. MS analysis
5. OAV calculation
 - a. The odour activity value = concentration odour threshold
6. Aroma model and recombination

He provided a fascinating example for pineapple juice where the influencing of processing had impaired the flavour, leaving spikes of flavour that were simply not there in the fresh natural product and were undesirable such as asparagus and other vegetable notes such as methional (a cooked potato-like flavour). Fourteen important pineapple aroma compounds were identified including several key



Durian



esters (Ethyl (S)-2-methylbutanoate OT 0.013 OAV 23900, Methyl (S)-2-methylbutanoate OT 0.25 OAV 5520 and 1-(E,Z)-3, S-undecatriene OT 0.02 OAV 437 which were only present in the processed juice in minute quantities (1-2%) probably due to the processors in Indonesia using leftovers from pineapple production rather than the actual fruit.

The team also analysed the notorious durian fruit to attempt to identify which sulphur compounds were needed to mimic its smell. This ground-breaking research identified five odorants never before identified in food (these chemicals are thiol full acetals with one thiol group alkylated: 1-(ethylsulfanyl) ethanethiol) as well as one of the esters found in pineapple (Ethyl (2S)-2-methylbutanoate) which was masked due to the relatively low OAV in comparison to the thiols. The sensomics approach created a recombinant of 20 compounds which when put to a panel was found to be almost identical to the actual fruit. Interestingly a mixture of only the ester and thiols was so similar that half the panel thought it was the actual fruit aroma showing how a few key odorants can dictate a flavour profile.

Peter went on to discuss how sensomics has also been used to investigate the interface between the body and food – a fascinating area that has been of interest for thousands of years to medicinal herbalists and pharmacists alike. He mentioned that a research team led by Krautwurst examined the whole body to look for active odorant receptor genes in non-olfactory organs and tissues; the findings were really noteworthy: -

Organ/tissue	Number of receptors
Heart	108
Lung	93
Testis	83
Liver	58
Taste papillae on tongue	7
Kidney	6
Intestine	4
Prostrate cancer cells	1

The question is then, why are they there and how do fragrance/flavour molecules reach these far-flung parts of the body? Peter explained that the location of volatile amines in the neutrophils and leukocytes (both white blood cells) could be stimulated to protect against bacterial invasion using chemotaxis and that it was perhaps this process that necessitates a stimulus from certain odorants. Some long-suffering students volunteered to be test subjects for a study on garlic, which meant that they had to eat raw garlic in large quantities and then their breath was collected in a vacuumized SilcoCan via a Teflon mouthpiece. A *sensomics* study was first done on garlic and this was compared to the levels in the breath at various intervals up to six hours after eating the garlic using GC-MS. Only one of the numerous chemicals in garlic aroma was found to be present in the breath (allyl methyl sulfide) but in unusually high quantities. Not only did the chemical persist for longer than the six-hour test time, but it was also present in far higher quantities than were actually in the original garlic (in 10g garlic there is 98ng whereas one subject had 384ng after six hours). The team concluded that there must be an *in vivo* formation of this compound from precursors in the oral cavity and this also reacts with the receptors in blood cells implying that there must be some kind of post-prandial function.

This is only a smattering of the information from Peter's fascinating presentation (my notes alone were the length of a book chapter) but I would urge those who are interested to look out his team's research publications and read around this exciting topic.

Finally, Joel Mainland, who has a PhD in neuroscience working on olfactory perception, gave an excellent lecture about the work of the Monell Chemical Senses Center where some ground-breaking AI work is being done in the fields of smell and taste to see if digitising olfaction is a possibility. He began by explaining how digitising sight, a relatively recent process, was made possible through a standardised code for red, green and blue light values alongside saturation and brightness axes enabling a 3d axis either in 3d form, as a vector or as a table with numerical values. A system like this (conceptually deriving from the



geological Munsell Soil Charts) has meant that absolute values can be given for any perceivable colour and they can be recorded as *Pantones*, which are universally understood regardless of the calibration of computer monitors. However, the ease with which we can correlate wavelength with colour and map visual space does not translate into the world of olfaction. Smell and taste are far more complex than the red, green and blue components of colour. We know that similarly structured molecules smell differently and dissimilar molecules can smell similar thus meaning that predicting odour from molecular structure is very challenging. As there are 400 olfactory receptors in humans and we can't predict which odour molecules will bind to which receptor, the world of smell is far more challenging to convey digitally. However, Joel was confident that the situation could be improved if there were a large enough data set to enable AI to learn the complex patterns that convey the relationship between molecules and aroma.

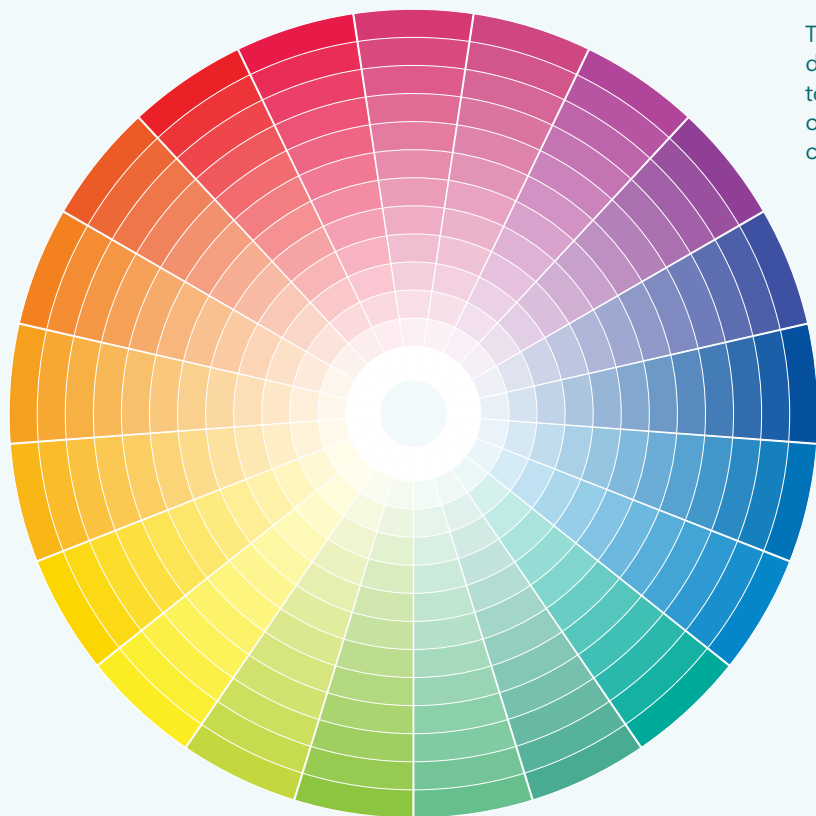
He set out the following goals: -

1. Predict if a given molecular structure has an odour – in lit molecular weight has to be under 350 but can't be 'too small' (never phrased in a quantitative way)
2. Predict perceived intensity from molecular structure – looking at threshold levels, need targeted intensity
3. Predict odour character from molecular structure – the big challenge and focus of the lecture
4. Predict perception of complex mixtures – how can we start to examine these?

The first task was to discover whether we could draw the boundaries of olfactory space in the same way that there is a visible spectrum of light and that there are also wavelengths outside this. Recent research has shown: -

- o An odorant must have a molecular weight less than 300 Daltons (Ohloff 1994; Rossiter 1996; Turin 2003)
- o An odorant must have a molecular weight greater than 15 Daltons (Ramsay 1982)
- o Odorants are typically hydrophobic and contain a limited number of functional groups (Rossiter 1996)

Thus with three parameters – hydrophilicity (vapour pressure and boiling point), fewer than three heteroatoms and a molecular weight of less than 300 and above 30 we have a model that can be applied to a very large database of every possible molecule, most of which have never actually been synthesised. This then gives target molecules for new research, an approach that the pharmaceutical industry has been taking for some time now.



The challenge of devising a system to predict the result of odour rather than colour mixes.

Predicting the intensity of an aroma is somewhat challenging and means that the idea of saturation found in coding colour is difficult to replicate. This is because it isn't an inherent quality of a molecule – there is no direct correlation between concentration and intensity that can be applied to all molecules since they increase in intensity at different rates. The Monell team wanted to see if there were any predictable patterns at all, so took 120 molecules to track their intensity and from this they have created an AI model that predicts the full concentration intensity for a given molecular structure (it can predict with a mean error of ~5 on a 100-point scale).

The big ask has always been to look at the relationship between molecular structure and odour. As was mentioned above, there appear to be considerable problems with trying to predict anything. Clearly, we must lack some information about what molecular features matter to the olfactory system and which are ignored. Particularly challenging are so-called 'activity cliffs' where a small change in structure leads to a significant shift in odour. Joel described a graph neural network (a common tool in AI) with the following parameters: molecular weight, whether an ester is present, hydrophobicity. The network combines each of these parameters in various ways to create a data set and then predict the probability that it smells a particular way. Each molecule is inputted with information about the node and atoms that are present; these are then transformed into a numerical vector which is inputted into the neural network using 138 odour descriptors which are tested by a human panel. This has identified which molecular features are important and which can be ignored and is a clear improvement on predecessors (Sanchez-Langeling et al 2019). The graph neural network is able to depict complex relationships between molecules and position F&F molecules within clusters of similar olfactory

notes such as florals and then see subsets of these broad categories such as lavender, jasmine etc. in a visual colour-coded representation. The panel were really highly trained to ensure that the results were accurate and the results show real promise.

With mixtures of colour, it is relatively straightforward to predict what will happen when colours are mixed together. With odours, rather than the simple three for colour, they have devised a system with 21 numbers derived from the molecular structure that can predict perceptual similarities between two complex mixtures. Initially this was done only with iso-intense odours which obviously doesn't represent reality. A more recent research paper (Ravia et al, 2020) expands this to include varying intensities so in theory, you could take a GCMS trace and put it through this model to be able to predict the olfactory characteristics of combinations. Although only simplistic at the moment, it shows real promise for the future.

Obviously all this AI promises numerous possibilities for the future from recording and sharing odours to quantification without the need for human panels as well as optimising molecules with respect to safety, cost and performance and the potential democratisation of elements of F&F with the creation of universal primary odours, making speed training more accessible.

As you can see the British Society of Flavourists has hosted some excellent online lectures and has also recently added a series of podcasts to its repertoire. I would thoroughly recommend membership of this and other learned societies or else you can attend lecture online for a small fee as a non-member. I enjoyed looking forward to see what the future holds for the industry and appreciated the comprehensive technical information provided as part of these talks.

WEBSITE REVIEWS

“this website ... provides an ideal reference source for fine fragrances”

Dr Tony Curtis

In a recent edition of the New Scientist there was a cartoon. It depicted two people talking. One says ‘There is information on everything on the internet!’ The second person responds with ‘Even better some of it is even true!’ In a past edition of the ICATS Newsletter we reviewed David Spiegelhalter’s book *The Art of Statistics: Learning from Data* (past editions of the Newsletter are available to download on the ICATS website). What particularly caught my eye when I first read this book was a quotation from a response he gave to a question ‘How do you avoid being blinded by numbers? He calls it ‘Sniffing the number [the dodgy stats.]’. Here is my summary of the rules he gives: -

- Why am I hearing this number [information]? Be sceptical of the motivation of the person giving the number [information].
- Are they trying to make it big or small?
- Are they trying to persuade me rather than inform me?
[Too often it is the former!]

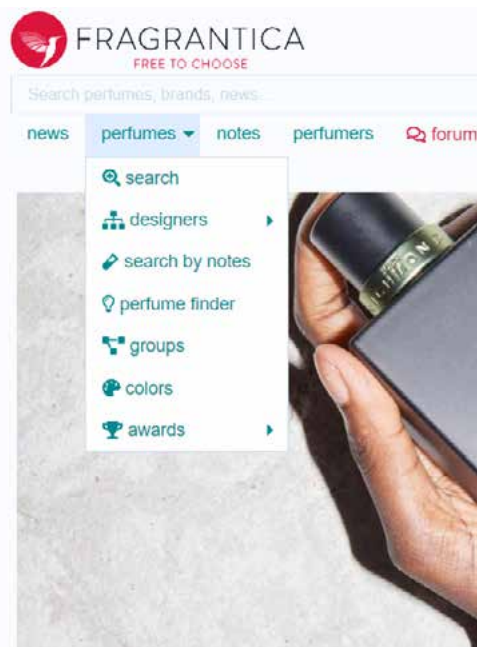
The subsidiary questions are: -

- Can I believe this number [information]?
- Where does it come from?
- Does it actually represent what I think it represents?

His explanation is ‘It is a bit like judging [sniffing out!] fake news’. I learned a new term ‘horizontal searching’: always evaluate the context of the figure [statement] since a number [information] without context is meaningless. I still have these key points from the above pinned up over my desk. In this review I have modified the word number to include all information.

I am a convert to *Wikipedia*. Recently I was writing some learning material involving vapour pressure of aroma materials and I wanted to check some definitions. No problem, there was a brief review of the range of definitions. However, there were also the nice citations to authoritative web sites / papers. I have a check list of dangerous words and authoritative is one of them. In simple language is this a source that I can trust and believe? As David Spiegelhalter advises – never suspend judgement!

Having given these warnings go and have some pure joy. The *Fragrantica* site is pure pleasure as well as being authoritative. I have occasionally participated in radio telephone programmes on perfumes. One of the common questions was ‘I like perfume x, what other perfumes do you think I might like?’ With this website this is not a problem. Visually exciting this site provides an ideal reference source for fine fragrances. As I write this review, I am listening to UK Classic FM. On my DAB radio I only have to glance at the display to see the composer of the current piece being played and its composer. You like a perfume by a given perfumer and would like to explore other perfumes by this person. Here is the site to help you. Here is another health warning. You go to check one thing and you find you have spent a fascinating hour browsing the vibrant cover of current perfumery news. Do go and explore this site you will enjoy it!



“...a treasure house of information on aroma materials such as chemical structure, organoleptic properties and applications”

The *Good Scents Company* site name is a bit misleading. The site is just as useful for flavour use of aroma materials. On my desk is my dogeared (after all it was published in 1969!) copy of *Perfume and Flavour Chemicals (Flavour Chemicals)* by Steffen Arctander. This is a treasure house of information on aroma materials such as chemical structure, organoleptic properties and applications. Well, we are in the 21st century and this site to me this website is Arctander on steroids. Also, as a major added bonus, it also embraces essential oils.

A bugbear with working with aroma chemicals and aroma materials is the proliferation of synonyms for a given material. Of course, this site covers this but it goes further, much further with detail. Arctander gives a short paragraph about flavour and fragrance uses. This site gives demonstration formulas! With essential oils it presents us with a library of photographs. I just wish I had this site available when I was writing my IFEAT Diploma study essays!

No discussion of Aroma Trades information would be complete without considering the *IFRA (International Fragrance Association)* website. The alternative title to this review should be ‘How to spend two hours being captivated by excellence on a wet

Sunday afternoon!'. After this I was daunted by the impossibility of doing justice to this magnificent site. In a short space I can only take a sample approach. One of the 'controversial' aroma chemicals is limonene. This widely occurs in a whole host of essential oils, particularly the citrus group. I return to the 'Spiegelhalter – test': does the site give a balanced view. The site gives all the key information CAS number, structure, synonyms etc. I am infuriated by some general reports which refer to limonene as a single 'chemical'. Limonene is an asymmetric molecule and thus may occur as the d form, the l form or as a d & l mixture (often called di-pentene). Of course, the IFRA site does cover this fully. In this context it is important to remember that the biological properties of a molecule can be significantly different for d and l forms (e.g odour properties of menthol). The IFRA guidelines are focused on the safe use of aroma ingredient. Accordingly, the review is on the safety in use of limonene (including the large group of limonene containing essential oils). The site does give a balanced and authoritative view.

Let us dig down a little to see why I consider this conclusion is justifiable. One of my Sunday chores is to check and clean my refrigerator. Today I found a mouldy scrap of Parmesan cheese at the back that had escaped my previous efforts. The green mould was a clear sign that this was not going to be good grated onto my spaghetti bolognese lunch! You read a report on a web page that limonene causes dermatological problems. What to think? Back to the 'Spiegelhalter – test'. What was the evidence for the assertion, what was the quality of the evidence? One is not surprised if you become ill after eating a pre-packed salad long past its 'best-before-date'. However, when did you last see a report on a safety issue for aroma product that allowed you to assess the quality of the evidence? What was the providence of the sample? How was it obtained, how was it stored, how was the test performed? In this case of limonene, we know that poor storage and long aging may cause the formation of contaminating peroxides, a well know problem for skin irritation.

I am a chemical nerd and I have experience of peroxide analysis. 50 years ago, I worked on the air oxidation of pinene to get to myrtenol. I used the B D Sully method for peroxide estimation. Yes GC / MS is vital to aroma materials analysis but it does not give the complete picture. Traditional wet methods are needed as well to compete the picture. These of course

were perfected 50 or 100 years ago. Wrong!!! Here we go to the *IFRA Scientific Guidance page and click on APPENDIX 1 to the IFRA Method for the determination of the peroxide value. Outline of factors that may influence peroxide value results in typical laboratory test procedures [September 2021]*. The report extends to several pages and in summary it concludes that results (peroxide values) obtained in the test can be affected by: sample size, reaction time, oxygen effects as well as other parameters. One of the aims of the IFEAT / ICATS educational programmes to develop critical insight. Here is a traditional analytical procedure with over a century of use but in 2021 it was still necessary to devote new investigations to pin down the precise procedure to get accurate and reproducible results. Why do I so appreciate the IFRA website? It provides not only data but allows the researcher to drill down to a wealth of supporting evidence with expert evaluation. It allows to reader to not only to note the conclusions but to come to an independent assessment of the weight and quality of evidence on which the conclusion rests. One can never suspend critical evaluation to gain full insight. The IFRA website is a fine example of a source which enables the reader to do this. Reader beware: if a source does not give you this ability to drill down you have every need to be cautious of the conclusions advanced.

“provides not only data but allows the researcher to drill down to a wealth of supporting evidence with expert evaluation”

Here is a short note for our flavour readers. The IFRA website is also a rich source for people engaged in the flavour, food and drink aspects of the aroma trades. There is excellent overview cover of GMP (Good manufacturing Practice) in the pages devoted to *IFRA Recommendations for Good Operations Practice*. This is applicable to all partners in the Aroma Trades industry value chain. The topics covered include: personnel, premises & sanitation, Quality Assurance, fragrance ingredients, quality control and storage, manufacturing operations, packaging and labelling, records pertaining to quality assurance & distribution, and health & environmental protection.

The IFRA website is not light reading but it is a comprehensive resource for all personnel engaged in our industry.

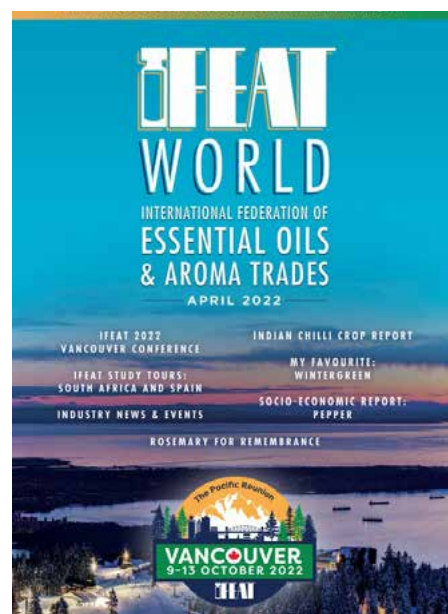
Now last but not least: the Diploma programme is devised and run by IFEAT and ICATS. Here I focus on one particular feature of the IFEAT website: the availability of past editions of IFEATWORLD. Apart from general reports on industry issues there are a series of autorotative reviews of key essential oils. These are unrivalled in their breath and depth of cover and are highly recommended. These may be found on the Publications page and click on Social-Economic Reports.

Well to round-up I must talk about our website. I must complement our Editor Deirdre Makepeace and our lead Reporter Dr Ali Green (ICATS Director of Studies). Ali provides our readers with quality reports on industry events. Things are ever changing and our newsletter gives you a chance to catch up on different developing trends such as sustainability. I try with my book reviews to signal some wider reading that will be of value to you. As ever my message is do find a bit of time for wider reading and when reading never suspend judgement and maintain critical insight. The ICATS current and past editions of the Newsletter are available on the ICATS website.

I end as I started, do keep to the Spiegelhalter – rules! Happy and informative web browsing.

Websites:

<https://www.fragrantica.com/>,
<https://www.thegoodscentcompany.com>, <https://www.ifrauk.org/>,
<https://www.ifeat.org> <https://www.icatsaromeducationcom.com/>



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