

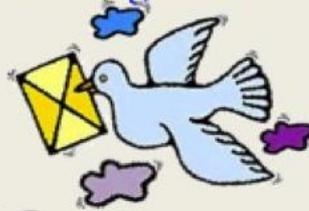
ECRQ
Newsletter
89

Autumn 2015

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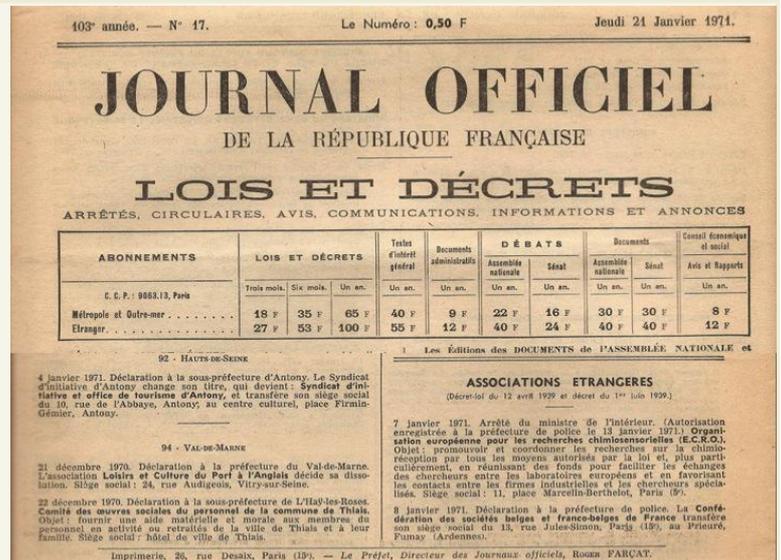


Dogs and ...worms sniff cancer 9



ECRO was inaugurated in 1970 at the International Summer Course on Odour Perception, in Utrecht, with the aim of promoting and coordinating research in chemoreception.

It was officially registered in Paris in 1971 and although it began as a European venture, it now has members from outside Europe and sees its function as world-wide. The goal of ECRO is to promote fundamental and applied research in chemosensory sciences, especially olfaction and taste. ECRO is financed by individual member subscriptions and by donations from industry and research institutions. Since 1978 ECRO has been affiliated with UNESCO.



The birth certificate of ECRO, 1971

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Editorial

Some theories are like the phoenix, the immortal mythical bird emerging to new life from its ashes. We are talking of the vibrational theory of olfaction, dating back to the 1950s, when it was first proposed by Robert Wright. It died long ago and was forgotten for several decades, but in recent years was regenerated from its ashes thanks to the fervid imagination of Luca Turin.

I think we all agree that heretical ideas can be the seeds of new exciting and unexpected findings, and the crazier they appear the most promising can become. But... all ideas and theories must be put to experimental test, this is how science works. Any other approach is not science. At least, this has been the rule since Galileo.

Several papers have been published in the last few years providing dubious and unconvincing evidence in support of the vibrational theory, while other papers revealed their pitfalls and inconsistencies.

Now, by coincidence, two new papers appeared on this subject providing opposite data and conclusions.

The first, using hard data of molecular biology, seems to put the end word to the vibrational theory, finally declaring it deceased...

At the same time another paper provocatively suggests that the theory first proposed to govern interactions between odorants and receptors can be extended to all other interactions between ligands and proteins, implying that biochemistry text books should be rewritten. What an interesting flash of genius! It is a pity that such preposterous assumption is not supported by a scrap of experimental evidence.

Along this line of doing science, you can find reference to another paper in this issue, proposing a mathematical model to analyse the flight of birds and understand whether they use olfactory cues or other senses to navigate.

Are we experiencing another revolution in science? Is the era of Galileo coming to its end, being replaced by a new approach to investigate natural phenomena which does not need experiments?

Another alarming phenomenon is contaminating science. The magic word now is *transcriptome*.

The technique is extremely useful as it provides a large amount of data, that represent the basis for future research. As such it should be certainly adopted as much as possible. But its misuse can lead to a lot of confusion in the databases and can be questionable.

Doing a transcriptome has become easy and cheap. Extract your RNA from whatever species or organ you are interested in, send it to a company, get the results and publish a paper. Often there is not an idea behind, not a question to answer or a phenomenon to investigate. Transcriptomes are done for their own sake. As far as you have a species or an organ where such analysis has not been done, there is ground for publishing another paper. And we are witnessing an abnormal proliferation of papers reporting just the results of transcriptomes. In several cases, the sequences obtained from this procedure are not even checked for correctness or to reveal contaminations. What is put out in the form of a manuscript sometimes only represents the informational basis on which to design a research project, but often is raised to the rank of an original research paper.

I want to dedicate these last lines to the memory of a great scientist, who suddenly disappeared while in full activity and productivity. Aldo Fasolo, who had recently retired from the University of Torino in Italy, was a reference point for those interested in the regeneration processes of the olfactory system, but more generally was a leading expert in olfaction. Although we only met occasionally, each meeting was full of interesting ideas, enthusiasm for science and for life, stimulating and captivating. In this issue we remember Aldo through the words of his collaborator Isabelle Perroteau. Here I like recalling, rather than his great scientific achievements, his honesty in research and his infectious optimism and joy of life.

From the President

Dear ECRO members, colleagues and friends

It is halftime now for the ECRO board. The situation for the society is quite stable. Thanks to Krishna who carefully watches our finances ECRO has been able to support a number of young researchers to attend AChemS and ECRO meetings as well as visit collaborating laboratories. We still encounter problems with our website regarding payments as some members have experienced. Krishna had to manually sort out all the problems and ensure that the incoming sums were correctly booked. My sincere thanks go to him for this extra burden of work.

Only a few weeks back we have organized our 25th meeting in Istanbul. It became obvious once again that ECRO is a lively and active community. Most participants agreed with me that we experienced good science and heard exciting talks and had stimulating discussion which made me believe that many of us returned with fresh ideas to their laboratories. We have had world leading experts from the US and Japan as keynote speakers and, besides poster sessions, plenary as well as parallel symposia. The latter stimulated a discussion about the question if we should maintain them at future meetings. It has been put forward that smaller meetings like Keystone Symposia or Blankenese Conferences with a quite coherent program should run only plenary symposia enabling participants to attend all symposia and not only those of their own field of activity. Others argue that parallel symposia give more people the opportunity to present their data which enhances interest and participation. I invite you all to contact me or any other board member to share your opinion with us about these controversial points of view and/or other issues regarding the program format. Soon this question becomes relevant again.

Another area of discussion relates to research in invertebrates. Participation of people in this field decreased over the years and in fact, even though this community is quite strong in Europe, we received little response to our call for symposia and attendance of the insect symposium at this meeting was low. I consider the invertebrate community an integral part of ECRO and would like to take this opportunity to call on the people of the invertebrate field to propose symposia for and attend the next ECRO meeting. The call will be published soon. A great success was the Young Investigator Symposium which has been co-chaired by Linda Buck and Stefan Fuss. Good research has been presented enthusiastically. Certainly, we will maintain this symposium type in the future.

Notably, the atmosphere during the meeting was extremely friendly which facilitated the exchange between researchers. We have to credit Stefan Fuss and his team of local organizers who hosted us so wonderfully making all this possible. The social program definitely supported the pleasant atmosphere. We started with the reception at the Sapphire, Istanbul's highest building. With a drink and finger food in hand to chat with friends and colleagues while watching the sun come down over the city at the Bosphorus was an unforgettable event. Not less remarkable was the Bosphorus dinner cruise at the last evening.

Unfortunately, attendance was less than expected, just below 200 registered participants perhaps due to the political developments in the Near East. Particularly, Japanese participation was low. On the other hand we have seen a good presence of our colleagues from the US and had also people from South America and Australia.

Next year will be a busy year. Besides AChemS and ECRO meetings ISOT 2016 will take place in Yokohama, Japan. I appreciate much that ECRO members were successful in submitting symposium proposals to the ISOT program committee and look forward to attend the symposia early June next year. For AChemS the symposia have not yet been selected but will be out soon. Also the call for symposia for the 26th ECRO Meeting in Athens will be published during the next months. Thus, there is still enough time to think of it already and to make plans in order to shape the program according to your personal desire. Also in November the ECRO board will decide on the venue for ECRO 2017 and I hope I can inform about this event in the spring News Letter.

Finally, I wish that you remain or become an active member of our community. I am often astonished who is not an ECRO member. So, please consider joining us, it is less expensive than a restaurant visit, and send your feedback to the above mentioned question or any other. The board has an open ear.

Best wishes
Wolfgang Meyerhof

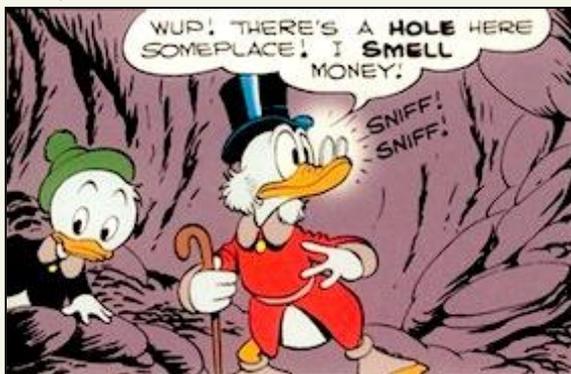
Treasurers Report September 2015

This year so far has been extremely busy where ECRO was concerned. We received 10024 Euro from the Polak Foundation and this was used to support a number of student grants for various activities listed below. This donation is on the basis of the number of ECRO members registered every year and is shared between AChems and ECRO – AChems declared 701 members compared to the 211 members who registered as ECRO members in 2014. We are eternally grateful to this pledge from Ernest and Ghilaine Polak in autumn 2004, who established "The Elsje Werner-Polak Memorial Fund in memory of our niece, gassed by the Nazis in 1944 at age 7." The annual income from this endowment is distributed to AChems and ECRO proportionately to the number of members in each organisation and is pledged for

- Awards to students, post graduates or junior researchers
- Student and invited speaker travel for annual meetings
- Symposia, workshops and seminars
- Seed grants e.g. to allow data to be collected for regular grant applications
- Meeting attendance fees for students
- Other similar purposes such as outward reach

So far for 2015 we have supported 15 students for various activities. In fact we had supported another three students who at the last moment decided to withdraw their applications due to cold feet over attending the ECRO Congress in Istanbul. They missed out on a wonderful experience.

The ECRO 2015 Congress in Istanbul was also very challenging – we opened registration and payments through the ECRO web site. While many people had no problems, others made mistakes that tested the programming of the web site to destruction. Two errors were most common – some people tried to register for the congress and then remembered that if they had paid the ECRO membership fees they would have had a cheaper rate. Others registered as ECRO members several times, sometimes with different email addresses and the system could not keep track of this- it no longer could send invoices with the correct amounts to the correct address. This meant that many payments had to be handled manually.



We thank you for your patience and understanding during this process, and we are attempting to correct these problems. Note that the ECRO board give their time to support ECRO and its members on a voluntary basis, and sometimes each board member is pressed for time.

In preparation for ISOT 2016 in Japan we made a contribution of 5286 Euro to the organisers – this is part of a prefinancing agreement between JASTS, AChems and ECRO so that when each society has the responsibility of organising the next ISOT they receive a contribution from the other two societies. We also supported the "Summer School in Human Olfaction" held in Dresden and organised by Prof. Thomas Hummel with a grant of 1000 Euro.

Our finances at the moment are healthy with 83916 Euro in our account. This does not include the conference account which is currently being balanced after the ECRO Congress in Istanbul.

Krishna Persaud
(Executive Secretary and Treasurer, ECRO)

ECRO grants

AChemS
Paul Bovelet
Alberto Cattaneo

Insect Chemical Ecology course
Guillermo Rehermann

ISOEN
Janos Soos,
Daniel Yushkanov

Summer School Human Olfaction
Johanna Reichert

ECRO Istanbul
Nitzan Dubovski,
Chryssanthi Tsitoura,
Christophe Verbeurgt,
Andres Alberto Hernandez-Clavijo,
Nilay Yapici,
Florencia Campatella Mayoral,
Melanie Denzer-Lippmann,
Rosa Maria Cavaliere,
Madlaina Boillat

Aldo Fasolo, a leading authority in olfaction



We miss the scientist and the friend

It is a very sad news that our colleague and friend Aldo Fasolo passed away, at the end of November 2014, quite unexpectedly, while still full active in

research. Only one year had gone since his retirement, that had been marked by feast organised by his friends and colleagues and a book with scientific contributions to him dedicated. His retirement at the age of 70 was only a change of position, as he continued his productive activity as Emeritus Professor at the University of Torino, Italy.

Aldo Fasolo was born in Alba, near Cuneo, Italy in 1943 and performed most of his teaching and research at the University of Torino, where he maintained the position of full Professor of Developmental Biology since 1980. His main interests were in developmental neurosciences and neuroendocrinology and he produced important contributions in the field of development and regeneration of the olfactory system.

He was member of the “Accademia Nazionale dei Lincei”, the most prestigious scientific association in Italy.

His high reputation and scientific level are also witnessed by having had a newly found species, a fossil fish, *Eoengraulis fasoloi*, named after him (Giuseppe Marramà and Giorgio Carnevale (2015). “An Eocene anchovy from Monte Bolca, Italy: The earliest known record for the family *Engraulidae*”. *Geological Magazine*.)



Aldo was also well known as a very skilled and captivating divulgator of science and started several initiatives and activities for communicating the products of research to the general public.

His enthusiasms for scientific research was contagious and he had the special gift of communicating his love of science and excitement for the study of nature.

His enthusiasms for scientific research was contagious and he had the special gift of communicating his love of science and excitement for the study of nature.

Aldo ended his life probably in the least tragic and painful way. After a long day spent in Trento, in northern Italy, where he delivered a talk on the links between gastronomy and chemical senses and a pleasant dinner in the company of old friends, he went to sleep and never woke up. A sudden disappearance and a shocking experience for his wife Paola Bonfante and his son Davide, but for him it was most likely “a perfect day”, an expression he had used to convey his feelings at the end of the day when his friends and colleagues had organised a feast to celebrate his retirement.

The last time I met Aldo was in the summer of 2013 in Beijing when he came with his wife who attended a Conference on Plant Pathology. We had a pleasant and relaxing dinner together and we parted with the wish of meeting soon again, in Italy or in China. Our wish could not be fulfilled.

Those of you who can read Italian could visit a website dedicated to Aldo with contributions from colleagues and friends at: <https://aldofasolo.wordpress.com>



What do the Eiffel Tower and a perfume have in common? They were created the same year, 1889.

Jicky is believed to be the first *modern* perfume, where synthetic components were incorporated into a blend so far only made from natural ingredients. In fact Jicky, which is still manufactured and sold more than a century later, includes synthetic vanillin, which could be prepared through the simple and cheap Reimer-Tiemann reaction discovered in 1874.

It is also the first perfume designed along a vertical structuring, the scheme of the three notes, widely adopted since then. The top note is given by the most volatile components, that first hit the nose and then quickly fade away; the middle note represents the body and the main character of a perfume, less volatile chemicals lasting several hours. The bottom note comes from heavy molecules endowed with low volatility and often acting also as fixatives in what they reduce the evaporation of the other components. These usually include *animal* notes, such as amber and musk, complemented in this case by synthetic vanilla.

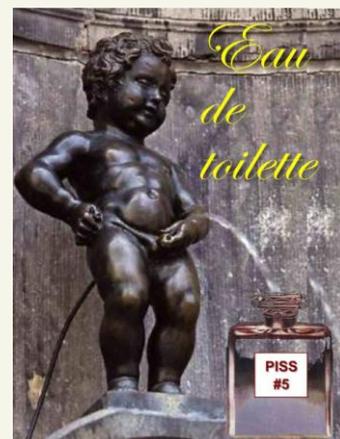
You are forgiven for laughing and making jokes, when you first see it, but take time to read it: this is a serious and important work. And also quite unpleasant to perform.

This time perfumers from Firmenich in Switzerland turned their attention from pleasant scents to the stench of latrines (Chappuis et al. 2015).

Quantitative headspace analysis of selected odorants from latrines in Africa and India. *Environ Sci Technol.* 49:6134-40). It was not a perverted olfactory taste that drove them to put their noses into such forbidding places. Instead, working for a perfumer company, they believe that knowing the identity of the compounds responsible for the stench of latrines could lead to better perfumes and deodorisers to counteract their powerful effect on our nostrils and contribute to improve the environment of such places of relief.

The composition of a typical bouquet reproduced that of a *modern* perfume, with top notes due to volatile mercaptans and trimethylamines, middle notes of lower fatty acids and cresols and finally an animal bottom note mainly produced by indole and skatole. The result, however, is quite different from the dream of perfumers.

Strangely enough, androstenone was not detected, despite the



fact that the smell of this compound is defined as old urine in abandoned latrines. The reason is that in the regions where the Authors collected their samples, men (androstenone derives from testosterone, therefore is male specific) generally urinate in the open.

Dogs can sniff cancer



The ability of dogs to detect cancer by sniffing at patients had been observed for long time, since in 1989 when *The Lancet* reported a case of a lady with a melanoma, who was sent to the hospital by her dog, who kept sniffing at her mole.

On the other hand, the fact that cancers have distinct smells was recognised even earlier, back in 1971, when specific volatile organic compounds (VOCs) were identified in the urine of patients with cancer.

It is not unreasonable that the modified metabolism in pathological conditions might produce VOCs typical of each kind of disease and that such compounds could be used as markers.

So far we know very little about the nature of such VOCs, but the use of dogs in cancer diagnosis is becoming more frequent and reliable. Given the high sensitivity of the dog's nose, it is possible that our friends can smell chemicals present in such low concentrations to escape even the most sophisticated GC/MS analyses.

Dogs are currently used in some medical structures to sniff breath samples to detect early signs of lung cancer or urine to detect prostate cancer.

In this specific field, dogs are already proven to perform much better than the currently adopted test, the PSA, which relies on a marker present in urine. While the PSA test is known for a high percentage of false positive, as well as for missing about 20% of positive cases, dogs are correct in 98% of cases.

In a large test performed by an Italian team in Milan (Taverna et al. 2015, Olfactory system of highly trained dogs detects prostate cancer in urine samples, *J. Urol.* 193:1382-7.), out of 900 urine samples examined, dogs gave only 16 false positives and 4 false negatives, much better than the PSA test.

For more information, here are some of the most recent papers on this subject:

Bijland et al Smelling the diagnosis: a review on the use of scent in diagnosing disease. *Neth J Med.* 2013 71:300-7.

Amundsen et al. Can dogs smell lung cancer? First study using exhaled breath and urine screening in unselected patients with suspected lung cancer. *Acta Oncol.* 2014, 53:307-15.

Horvath et al., Cancer odor in the blood of ovarian cancer patients: a retrospective study of detection by dogs during treatment, 3 and 6 months afterward. *BMC Cancer.* 2013, 13:396. Campbell et al. Canine olfactory detection of malignant melanoma. *BMJ Case Rep.* 2013 doi:10.1136/bcr-2013-008566.

de Boer et al. The scent of colorectal cancer: detection by volatile organic compound analysis. *Clin Gastroenterol Hepatol.* 2014, 12:1085-9

Dogs prove effective at sniffing out cancer. *Mayo Clin Health Lett.* 2014 Nov;32(11):4.



Dogs have certainly an excellent nose, but rats could perform as well, while insects are by far more sensitive than mammals. So, why not use insects? While research is in progress to adopt *Drosophila* for the task of smelling cancer, our opinion is that the insect olfactory system, while being extremely sensitive, is rather rudimentary compared to that of mammals, when it comes to discrimination. What makes dogs winners in this competition is their sensitivity is associated with an exceptional discriminating capability and large area of the brain associated with olfaction in these animals.

but worms might be even better



Hirotsu T, Sonoda H, Uozumi T, Shinden Y, Mimori K, Maehara Y, Naoko Ueda, Masayuki Hamakawa (2015) **A Highly Accurate Inclusive Cancer Screening Test Using *Caenorhabditis elegans* Scent Detection**. PLoS ONE 10(3):e0118699. doi:10.1371/journal.pone.0118699

After reports of dogs, mice and even humans able to smell cancer, it seems that even worms can do the task. A recent paper shows that the nematode *Caenorhabditis elegans* can diagnose different types of cancer at an early stage, being attracted to some yet unknown volatiles.

So, what is wrong in using dogs? They are too intelligent! apart from the fact that it is less practical to introduce dogs into a hospital ward than a Petri dish with hundreds of worms.

C. elegans does not perform very well in terms of I.Q. being equipped with a total of just 302 neurons, of which only 14 are chemosensors. However, it is endowed with hundreds of olfactory receptor genes, able to detect hundreds of chemicals in the environment. It is a huge array of sensors with very little capacity of processing the signals. In this respect, the *worm* probably represents the closest to an analytical instrument we can get among animal species.

Using a simple choice test the Authors convincingly show that these nematodes are attracted to urine and tissues from cancer patients (yellow bars in the figure), telling them apart for samples not only from healthy subjects, but also from patients with different pathologies (blue bars).

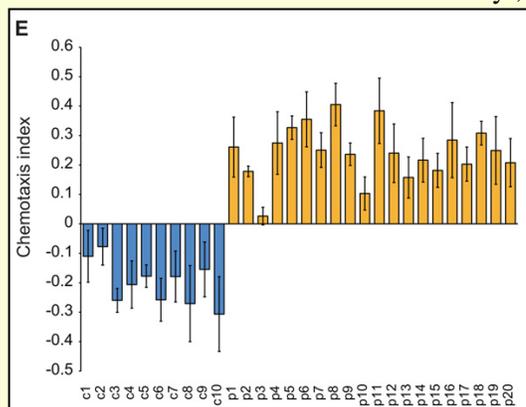
What are they attracted to? After showing that they use their sense of smell by ablating the olfactory neurons and losing the attraction behaviour, the Authors obtained the same effect with mutants lacking the gene *odr-3*, coding for a G-protein involved in detecting a number of volatile chemicals.

The search is not easy. The work can sense hundreds of volatile compounds with only three neurons, two of which mediate attraction, the third avoidance. Attractants include diacetyl, pyrazine, thiazoles,

benzaldehyde, butanone, isoamyl alcohol and many other chemicals. What it is remarkable is that with their primitive system unable to discriminate between a large number of chemicals, still

these worms show selective attraction to cancer-related volatiles.

The identification of the chemical messengers triggering their behaviour will certainly open new perspectives in the early detection of cancer.





Naming smells



A lesson from a tiny population

Have you ever realised that we Western people do not have a vocabulary for defining odours? All the terms we use refer to the source of smells (floral, fruity, moldy, pepper, pop corn, cinnamon and thousands more) or, in a few cases, to other sensory modalities (pungent, fresh, sweet). Is such lack common to other populations?

Asifa Majid, a linguist at the Max Planck Institute for Psycholinguistics, in Nijmegen, The Netherlands, is interested in answering this question by visiting populations in remote areas and learning about the way they name odours.

In one of her recent papers (Wnuk and Majid, 2014, *Revisiting the limits of language: the odor lexicon of Maniq*. *Cognition*, 131:125-138) she discovers that the *Maniq* are much attentive to smells and have 15 words in their dictionary to identify different olfactory qualities. These are words only describing odours, without any relationship to other experiences.

The *Maniq* are an ethnic group of south Thailand, a very tiny community of around 300 people scattered in the regions of . They are the only Negrito group in Thailand and speak their own language (*Maniq*, also called *Tonga*, *Kensiu* or *Mos*), a Mon–Khmer language in the Aslian language group. The *Maniq* are a hunting and gathering society. They build temporary huts of bamboo with roofs made of banana leaves. They hunt many types of animals and consume many different kinds of vegetables and fruits. They wear simple clothes made of materials such as bamboo leaves. They are familiar with many different species of medicinal herbs.

The total population of the “*Maniq*” is about 300 people divided in few communities in the provinces of Trang, Satun and Phthalung in southern Thailand.

Majid identified 15 terms to describe smells and for each of them managed to guess their meanings by asking people to associate each term to objects and experiences.

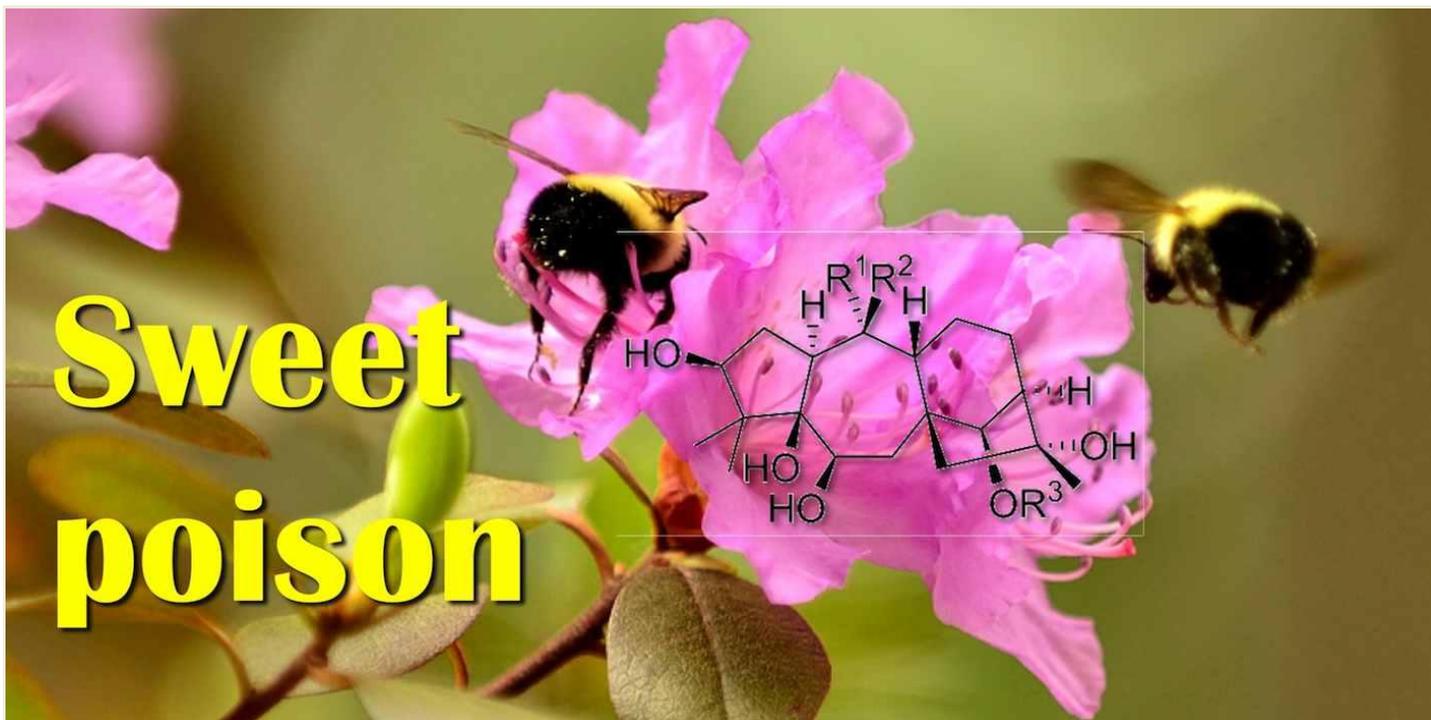
For instance, one of them was associated with *mushroom, mud, wet or dirty clothes, soil, old shelter* and other descriptors, probably a smell we identify as *musty* or *moldy*.

Another term is explained with reference to *blood, meat, food* and probably identifies the odour of raw meat, so difficult for us to describe.

She also analysed the grammar of these terms and found that 10 of them are verbs (the other being nouns) and actually mean: “to be... that particular smell”. Interestingly, such characteristic, of adjectives that grammatically are verbs, is quite common in Chinese, where to mean “the flower is red” we can just say “flower red”.

Another question she asked was how these olfactory sensations are organised by the *Maniq*. Starting from a paper, where all our smell descriptions find places in a mono-dimensional space (*Yeshurun, Y., & Sobel, N. (2010). An odor is not worth a thousand words: From multidimensional odors to unidimensional odor objects. Annual Review of Psychology, 61, 219–241*), pleasantness being the only variable, she proposes that among the *Maniq* odours are arranged in a space of 2-4 dimensions.

Are the olfactory terms used by the *Maniq* what is left of an ancient richer vocabulary, perhaps also present in the primitive idioms from which Western languages derive?



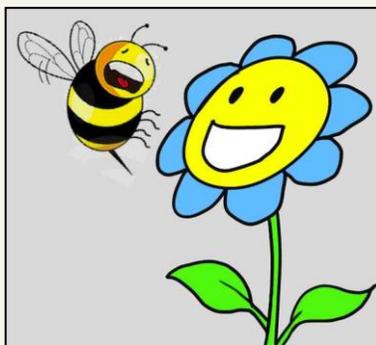
Nectar is not just sugar and may contain serious poisons. The nectar (and the honey) of rhododendrum has been known for a long time to contain substances capable of inducing stupor and other problems, such as low blood pressure nausea, numbness, blurred vision, fainting, hallucinations, seizures, and sometimes even death. The responsible compound is called *grayanotoxin* and finds its way into the honey unmodified.

Mad honey, as it is known, was responsible for shaping history in more than one occasion, since 65 B.C when the troops of General Pompey fell stupefied after consuming large amounts of this honey left on purpose by the enemy Mithridates and were easily killed by his soldiers.

Although rhododendron is perhaps the best known example of *mad honey*, the flowers of many other plants hide poisons in their nectar, such as azalea, oleander, yellow jessamine, angel's trumpet, heliconia, amaryllis and others.

So, the first question is: how do honey bees cope with such dangerous chemicals? First of all, they do not consume a lot of honey, particularly during the foraging season. Instead they use it more in winter to keep warm. In any case, most likely the honey is not lethal for the bees at the doses consumed, but only induces a sort of dizziness and torpor.

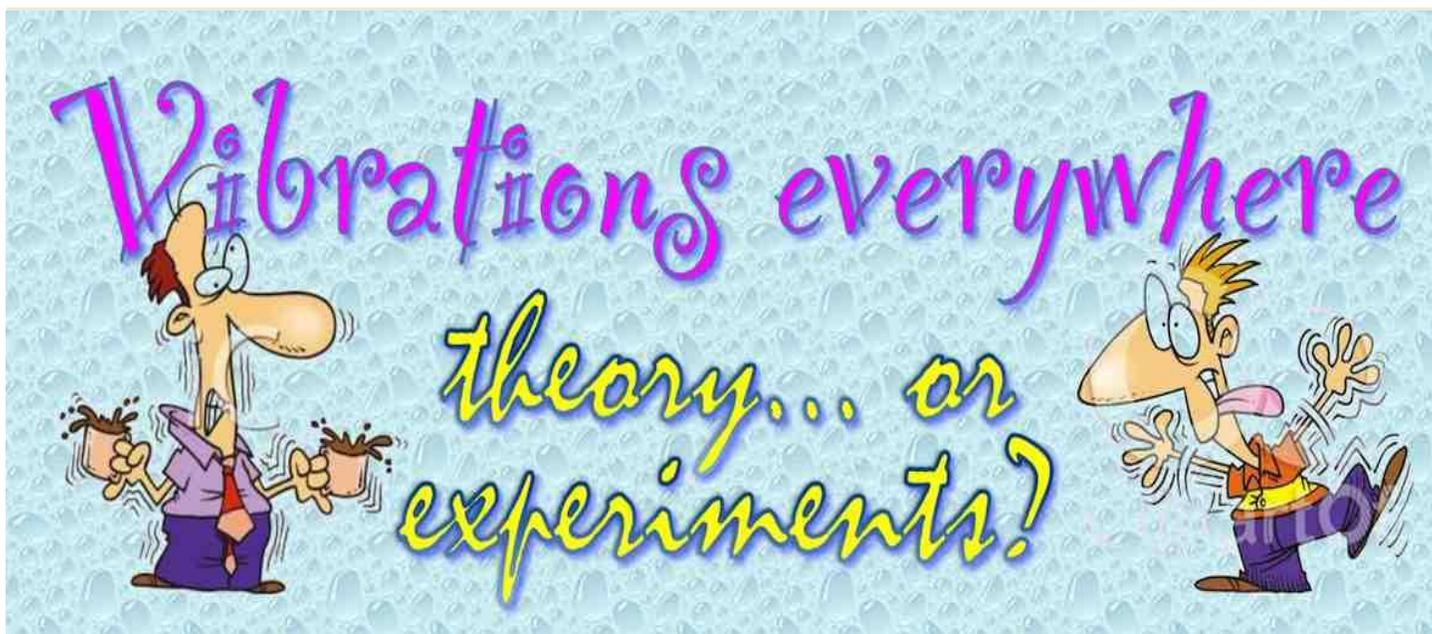
Another important and more general question regards the presence of poisonous (often bitter and unpalatable) compounds in nectar and their ecological meaning. If sweet nectar should attract pollinators, why make it bitter and send them away?



Well, insects still visit the flowers and taste the nectar, but, as soon as they perceive the bitter taste, quickly leave and move to another flower. The result is that they do visit the flower and get loaded with pollen, but only use a small amount of nectar, leaving the rest for more potential pollinators.

But there could be another effect of some bitter substances in the nectar.

A recent study (*Wright et al., 2013. Caffeine in floral nectar enhances a pollinator's memory of reward. Science. 339:1202-4*) suggests that the presence of caffeine in nectar could boost the memory of honeybees. In fact, insects that received a small dose of caffeine in their sugar solution were three times as likely to remember a learned floral scent, as compared to individuals that only received sugar. In this way, honeybees are more likely to return to the same flowers, thus enhancing the plant's reproductive success. The Authors also noticed that the concentration of caffeine in nectar of *Coffea* and *Citrus* species is below the bitter taste threshold of the honeybee and goes unnoticed.



We agree that scientist should keep an open mind free from prejudice and dogma. Even the most absurd idea should not be dismissed because of unorthodoxy, but seriously considered and put to test.

TEST! Since Galileo indicated the experimental method, science has been based on facts, measurable data, experiments, most importantly on the reproducibility of experiments.

Theories are welcome when we wander into an unexplored field, but they should be validated with experimental evidence before becoming scientific facts.

Back in the 1960s, when olfaction was still a mysterious and unexplored field, the late John Amoore probed the sense of smell through long, numerous and painstaking measurements to understand how the sense of smell might work. At that time, based on measurements of olfactory thresholds and correlations with chemical structure, he devised a theory, the "*Stereochemical Theory of Olfaction*". In simple terms he proposed that molecular shape and other stereochemical features determine the odour of a volatile compounds and suggested that proteins should exist in the olfactory organ to check such parameters on every molecule entering the nose and send relative information to the brain. What now could appear an obvious and simple idea, actually represented a major achievement more than 50 years ago, when the biochemistry of receptors was just in its infancy.

The fact that such theory was not obvious and trivial is witnessed by the long debate between John Amoore and Robert Wright, another scientist who proposed an alternative model, the "*Vibrational Theory*". According to Wright's view, the odour would be related to the vibration frequencies of molecules rather than to their shapes. The apparent advantage of this theory was a similarity of such a model with the mechanisms of vision and hearing, both based on frequencies. It would be appealing to think that all our senses share the same mechanism, but often Nature follows paths and provides solutions different from those which appear more aesthetically valid to our culture. We always tend to favour the most elegant solution, we always look for unifying principles, but experimental evidence often proves us wrong.

The debate between the two theories ended with the death of Wright, as often is the case in scientific research.

We all know that what was the other theory has become experimentally based evidence, in particular after the discovery and the study of olfactory receptors. On the other hand, the idea that odours should be related to stereochemical parameters was based on solid grounds, all the work done with other types of receptors, from those for neurotransmitters to those for hormones, as well as on much older acquisitions on enzyme chemistry.

A few years ago, a chemist and perfumer, Luca Turin, tried to resurrect the vibrational theory. One of the main arguments against this theory was the fact that it could not predict how two enantiomers, sharing exactly the same vibrational spectrum, could smell different. To overcome this difficulty, Luca Turin proposed that odorants should still interact with a protein, but then the activation of the protein would be triggered not by a conformational change (as largely proved in enzyme and receptor chemistry), but a quantum tunnelling phenomenon and related to vibrational frequencies in the IR spectrum of the molecules.

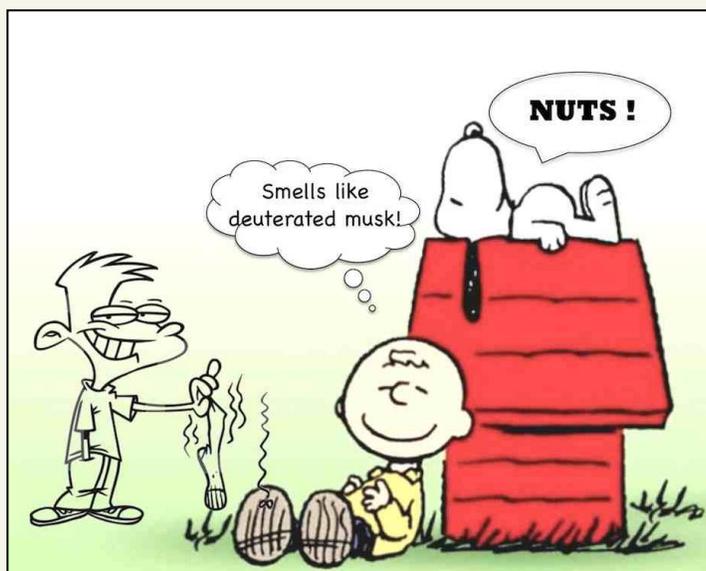
To test such hypothesis the obvious strategy is to compare the odours of “isotopomers”, which means molecules differing by having isotopes of the same elements, such as deuterium replacing hydrogen or carbon-13 replacing carbon-12. Of course the most dramatic effects are expected with deuterium/hydrogen substitutions as the atomic mass doubles and the corresponding vibration frequencies are greatly affected.

So, the task of Luca Turin was to prove that, when you replace hydrogens with deuterium in the molecule of an odorant, you end up with a different type of odour. He brilliantly demonstrated that this is exactly what is happening. How have we been so blind for generations not to detect what was just in front of our nose? We needed the ingenuity of a great perfumer (“*The Emperor of Scent*” is the title of a book celebrating his unrecognised genius) to find out that acetophenone smells different when you replace the hydrogen atoms in the molecule with deuterium (Turin L (1996) A spectroscopic mechanism for primary olfactory reception. *Chemical Senses* 21: 773–791.).

Unfortunately this result was not confirmed not only by other researchers (Keller A, Vosshall LB (2004) A psychophysical test of the vibration theory of olfaction. *Nat Neurosci* 7: 337–338), but also in a more recent paper of Turin and collaborators (Gane S, Georganakis D, Maniati K, Vamvakias M, Ragoussis N, et al. (2013) Molecular Vibration-Sensing Component in Human Olfaction. *PLoS ONE* 8(1):e55780).

But, never mind, acetophenone is discriminated from its deuterated isotopomer by fruit flies. This excellent paper, published in PNAS (Franco MI, Turin L, Mershin A, Skoulakis EM (2011) Molecular vibration sensing component in *Drosophila melanogaster* olfaction. *Proc Natl Acad Sci U S A* 108: 3797–3802.) is very deceptive and contains a number of pitfalls, that make the entire work inconclusive. The drawbacks of this article, which, although the conclusions are completely unsupported by experimental data, however contains some good chemistry, uncovered and exposed one by one in a previous issue of the *ECRO News Letters* (Spring 2011 issue no. 82).

Having admitted that the smell of acetophenone is not affected by deuteration, Turin turned to musky odorants and in another paper published in Plos One (Gane et al., 2013) reports that deuterated musks smell nutty instead of musky. What a change! Can we believe him now? How pure were the samples? It is reported that they were GC pure: what does it mean? they showed a single peak in GC analysis? in such case they could still contain impurities undetectable by the instrument but clear perceivable by the nose. Where they purified by preparative GC? even in such case we cannot discard the possibility of contamination or of other chemicals with same or similar retention time. Where they sniffed at the GC port? We know for sure this is not the case, as the Authors report that the compounds were presented to the judges in eppendorf tubes.



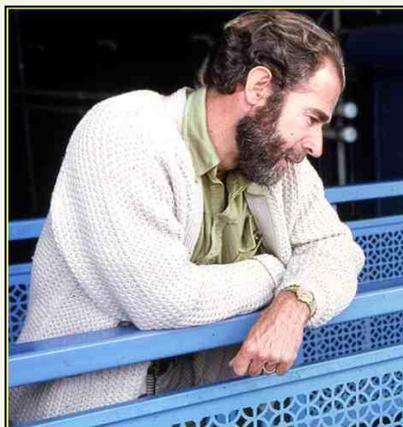
To prove that Turin's results are wrong and unreliable, a major study, involving 16 Authors from 7 Institutions across the world has been recently published in PNAS (Block et al., *Implausibility of the vibrational theory of olfaction*, PNAS 2015).

The Authors take a different approach and rather than relying on odour descriptions go straight at the molecular level and record responses from olfactory receptors expressed in heterologous systems to the molecules of contention. As predicted, they find no differences between isotopomers (musky odorants bearing hydrogens or deuterium atoms). But the work is much wider and deeper, addressing other important aspects, such as that of the purity of samples, the modelled interactions of musky odorants with their putative receptor, besides examining the validity of the physical model proposed in support of the vibrational theory.

For example, they find that the NMR spectrum of the deuterated compound used by Gane et al. contains a small peak absent in the sample prepared by Block et al., suggesting that the differences in odour quality observed in the first paper could be due to an overlooked impurity.

Despite the high quality of several papers published to disprove the results and therefore the theory of Luca Turin, we feel that perhaps this is not most efficient way counteract this strange phenomenon. To every criticism from one side the other side respond with new data either based on incorrectly performed experiments or leading to conclusions not supported by their experimental data.

There are hundreds of examples of molecules different in chemical groups, but similar in shape, that smell similar against only a couple of examples where the opposite behaviour has been observed. These few cases are taken in favour of the vibrational theory overlooking the large majority of molecules supporting the current view. It is enough to recall the camphor smell offered by a large variety of molecules from hydrocarbons to alcohols, ethers and ketones, both open-chain and cyclic structures, all sharing a medium size and a round shape. All these molecules, so diverse in functional groups certainly produce drastically different vibration spectra, but are still endowed with the same type of smell.

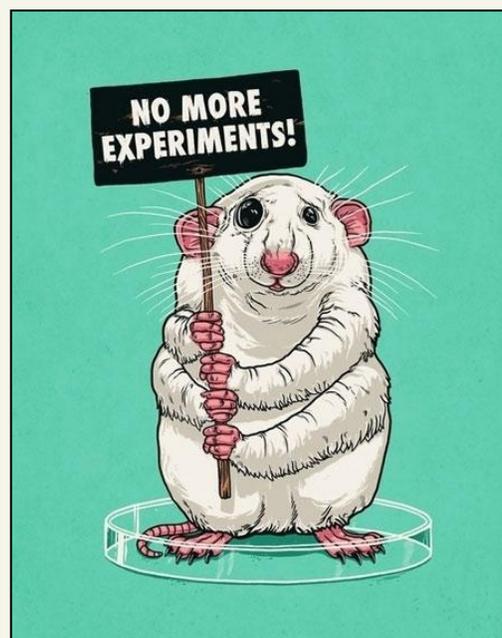


It is regretful that in this complex and long debate supported from both parties by sophisticated experiments and very fine chemistry, where the most advanced techniques are used to check for the presence of impurities and for measuring responses, the name of John Amoore (here in a picture taken in 1975) has been completely forgotten. His simple observations and correlations were very effective half a century ago to convincingly disprove the vibrational theory even without the support of any

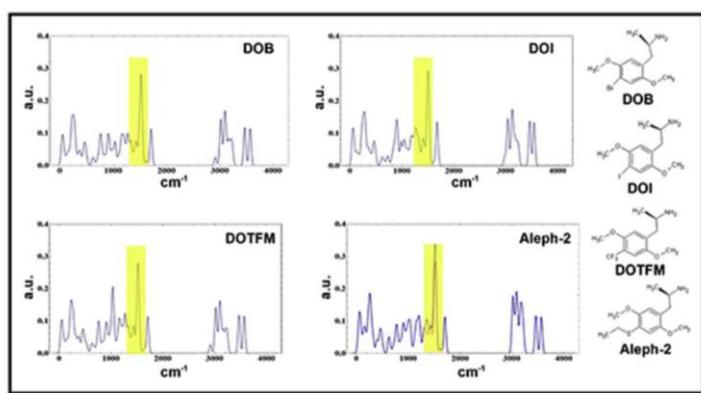
biochemical evidence of binding proteins and receptors. Even now they still retain their power and validity.

Is this the end of the vibrational theory? Like the mythical phoenix, the bird resurrecting over and over again from its ashes, this theory, however based on questionable data, still finds supporters.

Nowadays, experiments are not necessary any longer, computer simulations, ideas, calculations can replace the observation of natural phenomena. These works of the human imagination are fascinating and attractive, **who cares about experiments? If necessary, they can come later, just to convince the stupid.**



This is probably the philosophy behind a paper published in Scientific Reports (Ross et al., *Neuroreceptor Activation by Vibration-Assisted Tunneling*, Scientific Reports, April 24, 2015) at the same time or just after that of Block et al. in PNAS. The Authors, who do not include Luca Turin, based on the shaky and questionable reports of the *Emperor of Scents*, extend the theory to other receptor systems. There is a lot of physics and calculations (but no experimental data) supporting the idea that vibrations can be at the basis of chemical recognition. The Authors calculate tunneling spectra for some serotonin derivatives and arbitrarily select one of the many peaks in

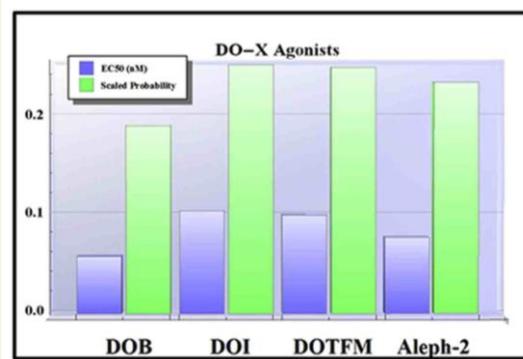


the spectra to compare with published activity of the same compounds. This is enough to reveal a correlation and to convince the naïve reader. The compounds all have activities within the same order of magnitude and the peak in the spectra was chosen as the best conserved among all the chemicals taken into account. What happens if we include in this study compounds of different structure, but equally effective? In the end the Authors also suggest some experiments that could be done, but they had no time to waste in such trivia.

By dismissing the results of decades performed by the most eminent neuroscientists, the Authors conclude the Abstract with the most arrogant sentence: “*If validated our theory may provide new avenues for guided drug design and elevate methods of in silico potency/activity prediction*”. **Welcome to the founders of the new science!**

Generations of scientists have learned that scientific investigation follows a common strategy: observe, measure and then interpret. Now the process has been reversed: first propose a theory, then plan the experiments to prove your idea is correct.

Of course, as scientists we should keep an open mind. We cannot discard the hypothesis that Luca Turin will eventually prove that his theory is correct, while we all have been following the wrong track, starting from the

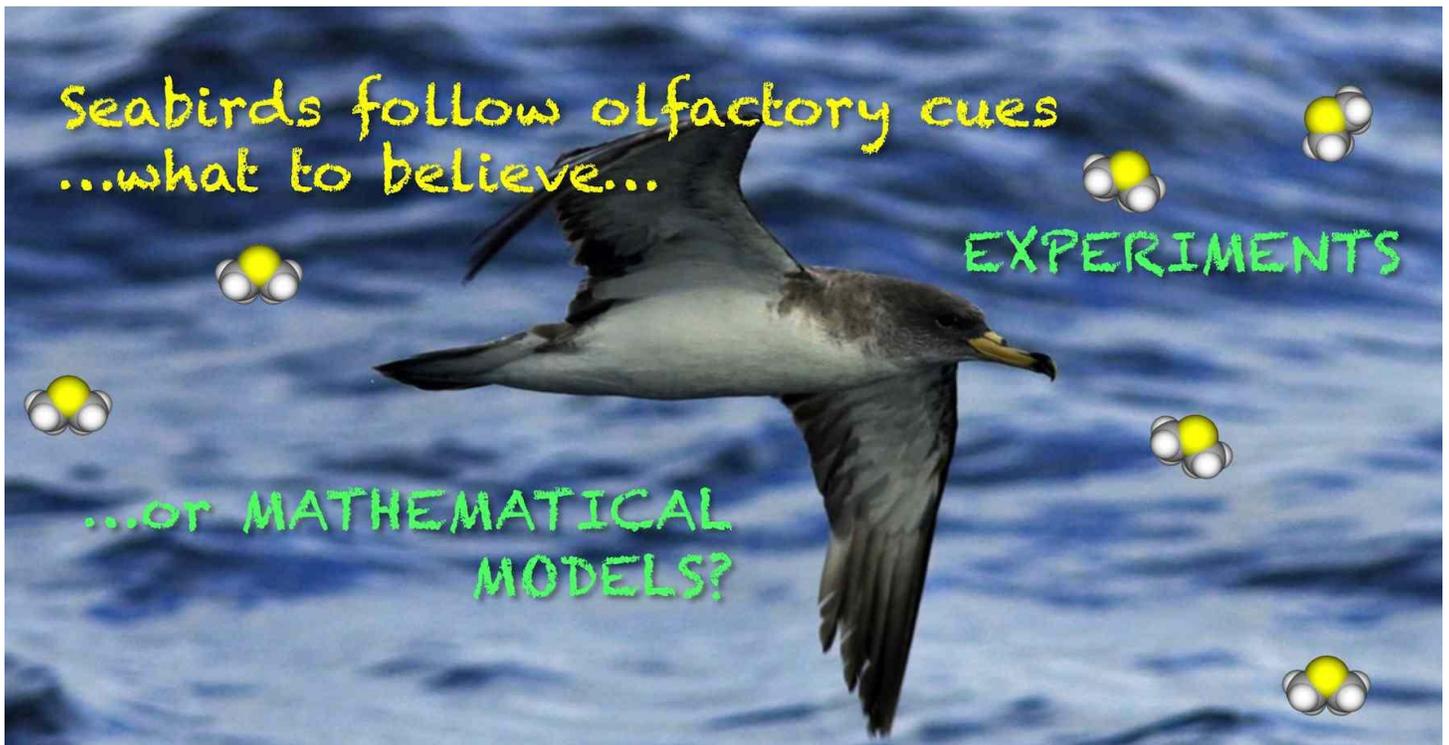


first enzymatic studies and through the enormous wealth of research that ensued, documented in thousands of excellent papers and recognised by Nobel Prizes. Yes, all this is still possible, as is possible that water keeps memory of molecules that were dissolved and are not there any more or that people might be able to move objects if they can think really hard. But to prove all this we need a lot, but a real huge lot of convincing experimental evidence. Short reports that two molecules smell alike or different, followed by contrasting data by the same Authors, or complicated calculations without any hard data are just smoke in the eyes readily accepted by those who still want to believe in fairies and magic.

It is time that reviewers and editors pay more attention to whether rigorous scientific methods have been applied before publishing papers that get a lot of visibility only because of strange ideas. These reports easily and deviously sneak into the media (*New Scientist* 18-11-2006, 10-12-2006, 14-2-2011, *Chemistryworld* 28-1-2013 to cite some of the most reliable scientific magazines) and contribute to confuse the ideas of those, outside the specific field, willing to satisfy their scientific curiosity.

The following report seems to confirm that in fact experiments will soon be out of fashion and in any case can only suggest some hypotheses.

The final demonstration should come from MATHEMATICAL MODELS!

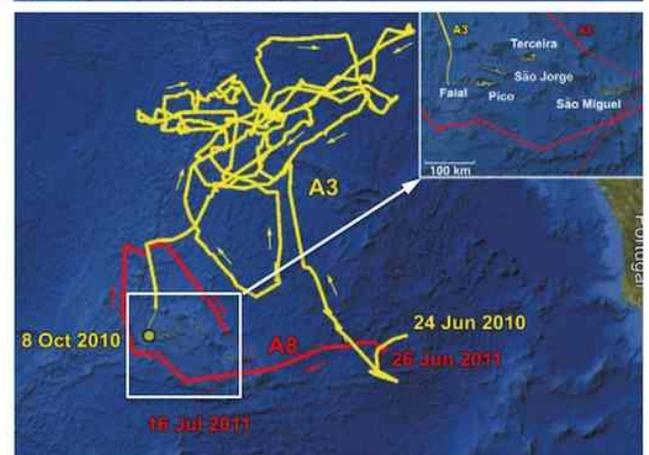
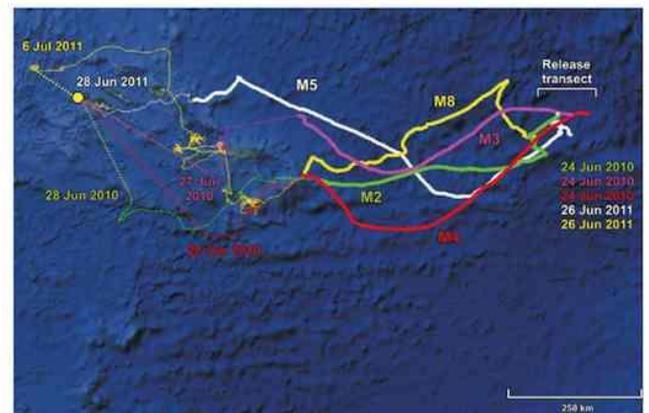


Two years ago a paper published on the Journal of Experimental Biology provided clear evidence that shearwaters are guided by their olfaction to locate foraging places and to navigate over long distances on the ocean. (**Gagliardo, Bried, Lambardi, Luschi, Wikelski and Bonadonna, 2013, Oceanic navigation in Cory's shearwaters: evidence for a crucial role of olfactory cues for homing after displacement. J. Exp. Biol. 216, 2798-2805**).

The Authors equipped shearwaters with GPS devices to record their navigation paths when the birds tried to return home. Using anosmic and magnetically disturbed individuals, as well as controls, they clearly showed that olfaction, rather than magnetic field sensing was used to navigate. In fact, anosmic birds got lost and only after long erratic wandering few of them eventually found their way home, likely using visual cues, while those magnetically disturbed behaved just like controls.

The results appear very clear and convincing. However, according to a recent paper published in the Proceedings of the Royal Society, better evidence could be provided by analysing the flight of the birds, using a mathematical model:

Reynolds, Cecere, Paiva, Ramos, Focardi S. 2015 Pelagic seabird flight patterns are consistent with a reliance on olfactory maps for oceanic navigation Proc. R. Soc. B 282: 20150468.



Magnetically disturbed birds (M) followed straight paths back home, anosmic (A) went long distances and got lost (from: *Gagliardo et al., 2013*).

“Levy flights” are random walks, but showing in the long term a direction. Typical is the case of the moth’s zig-zag flight when following a plume of an odour.



The term was proposed by Benoit Mandelbrot in 1982 and is named after the French mathematician Paul Levy.

Such typical movements have been widely studied in connection with different animals searching for food or generally for chemical cues. The Authors of this paper have analysed the paths of shearwaters recorded in several locations using the “Levy flight” model and conclude that the birds use olfaction to navigate. Well, this is one more example that animals searching for odours follow a “Levy path”... or the other way around?

We should get used now to the evidence provided by models and not be misguided by the hypotheses suggested by experimental data. In a world dominated by virtual reality this should not be surprising, although there are still scientists who still believe in time consuming experiments.

In fact, the Authors of this paper acknowledge the fact that “...*Cory’s shearwaters deprived of their sense of smell showed dramatically impaired homing ability (Gagliardo et al., 2013)*”, but hurry to warn the reader that “...*this experiment as well as the few attempts to demonstrate olfactory maps in wild birds, only suggests that olfaction plays a role in homing, without demonstrating the use of olfactory navigation.*”

And, to validate experimental results, they apply their models based on theories and calculations “*Here, using an innovative non-invasive approach, we provide evidence that shearwaters rely on olfactory cues for oceanic navigation. It is based upon a mathematically rigorous and general description of olfactory-cued navigation*”.

If we understand correctly, the conclusion is that experimental data obtained with anosmic birds only SUGGEST that birds use olfaction to

navigate, whereas a mathematical model applied to their mode of flying DEMONSTRATES that they indeed use olfactory cues.

The Authors also suggest that their method brings another important advantage: you do not need any more to do manipulations on the animals and inflict pain upon the birds. Their method could be more generally applied to many other species, thus avoiding unnecessary suffering.

We wonder what Galileo would think of this new method of scientific investigation, but of course if he could come back to our modern world, he would not understand computers and modeling, therefore his opinion should not be considered.

Instead, the opinion of media is highly authoritative these days and this paper indeed collected a lot of positive comments, that you can find at the website:

http://www.fi.isc.cnr.it/index.php?option=com_k2&view=item&id=167

Here are a couple of representative comments:

*Seabirds can fly for many days and nights across featureless oceans to their preferred feeding locations and then fly back to their nests without getting lost. How they do this has long been a mystery. **Now through a careful analysis of their flight patterns, researchers have shown that seabirds are following their noses and navigate using an “odour map”***

After foraging out in the open ocean, seabirds like albatrosses and shearwaters are able to find the way back to their colonies with astounding accuracy.

*Exactly how do they pinpoint their tiny, remote island homes across vast expanses of featureless seascapes? Researchers have proposed ideas ranging from magnetic cues to landmarks based on local odours. Now, a team studying the movements of GPS-tagged seabirds reveal that it’s all in the nose: They rely on olfactory maps. The work was published in *Proceedings of the Royal Society B* last week.*

*Previous homing studies have suggested that shearwaters navigate by assembling cognitive maps of wind-borne odours, but this has never been properly tested. **Experiments** with wild birds involving invasive sensory manipulation sort of **defeats the purpose.***

WELCOME to the era of experiments-free science!



*Stefano Mancuso and Alessandra Viola - **Brilliant Green: The surprising history and science of plant intelligence.** Island Press, hardcover £ 12.89*

This is a very provocative and stimulating book. No matter if you agree or not with his ideas, Stefano Mancuso will keep you strongly hooked until you reach the last page.

The title itself is provocative. Intelligence of plants? is it science fiction? after all, plants do not have a central nervous system, therefore talking about intelligence is out of question. Certainly, until we search for some capability analogous to our way of analysing data from the environment and respond appropriately.

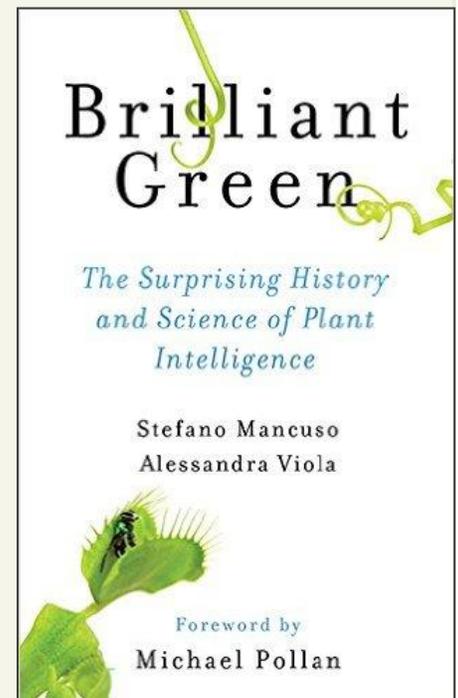
But we can look at the problem from a different perspective. Can plants obtain information from the environment? Certainly they can and for this task they use the *five senses* pretty much as we do. Everybody agrees that plants can detect light, even if they have no eyes, can be affected by sounds, and Mancuso goes a long way to provide plenty of evidence for such sense, from the the anecdotal reports of breeders who use classic music to obtain better plants to scientifically planned experiments. Plants do not have hears, but also many animals, such as snakes and worms lack specific hearing organs, still they can detect sounds.

What about touch? We have all experienced the response of the leaves of *Mimosa pudica* when we stroke them, and all the carnivorous plants can detect the presence of insects touching their bristles.

Olfaction and taste are very active in plants: the roots search for nutrients, parasite plants grow in the direction of hosts, guided by volatile cues, and we know now for sure that plants talk to each other sending warning messages if they have been attacked by insects or other animals.

So, plants have the five senses and many more, according to Mancuso, and respond to their inputs with specific reactions. Is this enough to talk about *intelligence*? After all, we talk of *intelligent sensors* when the measurement of a given parameter, such as temperature or humidity, triggers some sort of response. In this sense, plants can be considered as intelligent devices.

There is a completely unexplored world to be discovered. We more or less know the stimuli affecting reactions in plants, but are we still completely unaware of the machinery the plant uses to produce a *behavioural response*, receptors, signal transduction and other biochemical and physiological events.



Report from Istanbul

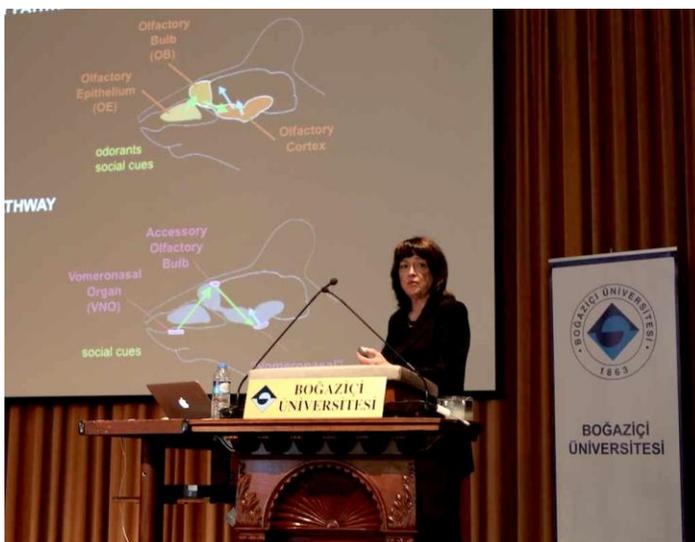
Krishna Persaud sends a brief account of the ECRO Congress

The ECRO Congress 2015 in Istanbul was a historic occasion for our organisation. It was the first such meeting to be held in Turkey and at Boğaziçi University. Stefan Fuss and his team at the “Senselab” had spent many months preparing and delegates were welcomed and treated with great hospitality. The campus is tranquil and secluded, close to the Bosphorus river with spacious lawns. The scientific part of the conference was of high quality, with Linda Buck giving a plenary talk “Deconstructing Smell” at the start of the congress. A new aspect was the “Young Scientists Symposium” where young scientists were invited to give short presentations of their work, and this was one of the highlights.

The plenary session “The Structure-function relationships of taste signalling molecules” chaired by Robert Margolskee and the keynote lecture by Hitoshi Sakano “Olfactory Circuits: From Receptors to Behavior” were for me memorable and eye-opening sessions. The cheerful group of Stuart Firestein, Charles Greer, Peter Mombaerts, Frank Zufall and Ximena Ibarra-Soria had great fun dissecting vertebrate olfaction, and empowered the meeting. A “Career fair” chaired by Marika Kapsimali attracted much attention from young researchers present. The Congress concluded with a gala dinner and cruise down the Bosphorus river which was an unforgettable experience.

The photos show Linda Buck at the plenary presentation and the key players in the young scientists symposium.

Krishna Persaud



Students' reports

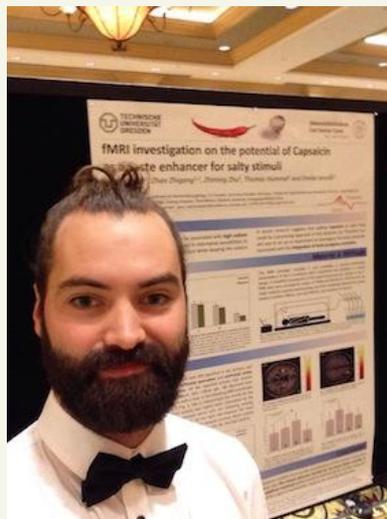
Every year ECRO offers many students and young scientists the opportunity of attending Conferences or visit other labs for short periods, providing them with grants. Here they report on their experiences, both scientific and human.



Please, go to the end of this section for some advices and suggestions on how to write your report ★★★

Paul Bovelet from AChemS 2015

Receiving one of this years ECRO travel grants gave me the opportunity to attend the 37th annual meeting of the Association for Chemoreception Sciences (AChemS) in Bonita Springs, Florida. I am very grateful for this opportunity to meet many of the leading scientists in this fascinating field of research and for having been able to present my own scientific approach in terms of human taste during one of the poster sessions. Presenting the results of my study about the "fMRI investigation on the potential of capsaicin as a taste enhancer for salty stimuli" during one of the sessions has been a wonderful experience. Members of the scientific as well as the corporate chemosensory community were asking all sorts of questions while giving interesting advise and feedback. This helped me a lot with finding out about the strengths and weaknesses of my study. Besides all the input regarding my own work however, the meeting had so many other interesting events to offer including several oral sessions, workshops and symposia.



These were giving the audience an unique insight in most recent research projects, while offering the chance to question their originators at the same time. One thing I was enjoying especially about the meeting was the interdisciplinary approach between the scientific and the corporate world. For example the industry workshop "Application Of Chemosensory Science To Industry Needs: Sugar Replacement, Salt Reduction And Aromatherapy" was supplying lots of additional background information to me as well as a critical view on potential contrary interests between medical sciences and industrial needs.

As a medical student I was also pleased to find several talks regarding clinically relevant topics in the program such as "The Importance Of Chemical Senses During Early Life" by Valerie Duffy. Additional to all this, several social gatherings like the "welcoming banquet", the "fun run/walk" and student meet-up events were creating opportunities to get in touch and speak to other scientists from all over the world on an informational basis.

Finally there is nothing left to say than: thank you again ECRO for making this experience possible for me! I would recommend it to any student in the field of chemoreception sciences and hope to be able to attend it again in the near future myself.

*Paul Bovelet
Interdisciplinary Center for "Smell & Taste", Dep. of
Otorhinolaryngology, TU Dresden, Germany.*

Alberto Maria Cattaneo from AChemS 2015

Introduction

Since July 2011, I am a graduate student from Fondazione Edmund Mach (FEM), a private law foundation based in San Michele all'Adige - Italy that carries out research and training activities in Agriculture, Food, Health and Environment related fields. My research project is focussed on the investigation of the role of Olfactory Receptors (ORs) and TRP-channels of the Codling Moth *Cydia pomonella*, one of the most notorious insect-pest species threatening apple, pear, walnuts and other fruit crop orchards worldwide. The aim of my project is the investigation at the molecular level of the activity of olfactory sensory proteins to identify novel strategies for mating disruption and integrated pest-managements of the insect.

I am a member of ECRO since 2012, and of AChemS since 2014.

Last year I joined the AChemS meeting for the first time. During AChemS 2014, I met the members of my current partnership, the Whitney laboratory for Marine Bioscience of the University of Florida (UF). From September to now, I am undertaking research abroad as a visiting graduate UF-student and I am assessing key experiments of heterologous expression in HEK293T cells of ORs and TRPs of the Codling Moth.

Because of the incoming termination of my PhD, the participation to AChemS 2015 with a travel grant from ECRO represented an extremely important contribution. It was a chance to tighten my network for my career perspectives, to find the expertise to discuss about my final findings and to take advantage to think about further conclusive experiments for my research.

Conference venue

The meeting was held in an amazing location in south-west of Florida, the 4-star hotel Hyatt place coconut point resort and spa of Bonita Springs. Hyatt place is a very luxurious hotel, supplied with all comforts for its costumers, but only theoretically provided with all facilities.

While the event was extremely well organized, unfortunately the accommodation management of Hyatt was not as well efficient. For instance, me and two members of my research group reserved a bedroom to host three costumers; the reservation was accepted but just two beds were provided in the bedroom without any option to accommodate the third of us on a further bed. A rotation to sleep on the floor, unacceptable in a 4-star hotel, was not possible to avoid.

Conference organization

Symposia were organized in two separate spacious *ballrooms* and lectures were efficiently synchronized to allow the audience to join their favourite presentations. Breakfasts on early morning, and social breaks during the rest of the day were set in a further *ballroom* with access to a big terrace, with the aim to promote easy and pleasant interactions among members of the scientific and the industrial community.

Six poster sessions were planned at the beginning and at the end of each day, and authors were allowed to present their posters as they preferred: rather during their sessions or for the whole day. I prepared my contribution showing most of the data I collected in the last eight months at the University of Florida with a poster entitled: "Functional characterization of heterologously expressed Codling Moth Olfactory Receptors".



Taking advantage from the whole day-time available for poster presentation, I interacted with famous personalities in the field of molecular ecology of insect olfaction, I shared contacts, and discussed about possible collaborations and recruitment availabilities.

I was impressed about the sophisticated organization of AChemS: in example, corners with industries were planned during breakfasts and social networking with senior members were efficiently intercrossed between symposia. This made the attendance of the whole conference more functional, informative but especially relaxing.

This year, an interesting 5 km fun-run event was organized on Friday afternoon, between 3 and 4 pm. It was very nice, funny and recreative to take part to the initiative, even if I am convinced that from the next meeting, it would be better to manage the fun-run timetable on early morning or during the evening. This would optimize the participation of a higher number of members and it will avoid any risk of heat-related fainting (as it happened to one of the participants) caused by outdoor physical activities on late-April season of south-Florida (T 34°C, RH 66%).

Acknowledgments

I want to give a special thank to two executive committee members I had the pleasure to meet this year: the President Debra Ann Fadool and the Program Chair Dana Small, for their lovely welcoming at the conference, their efficient management and the successfull result in the organization of this amazing event.

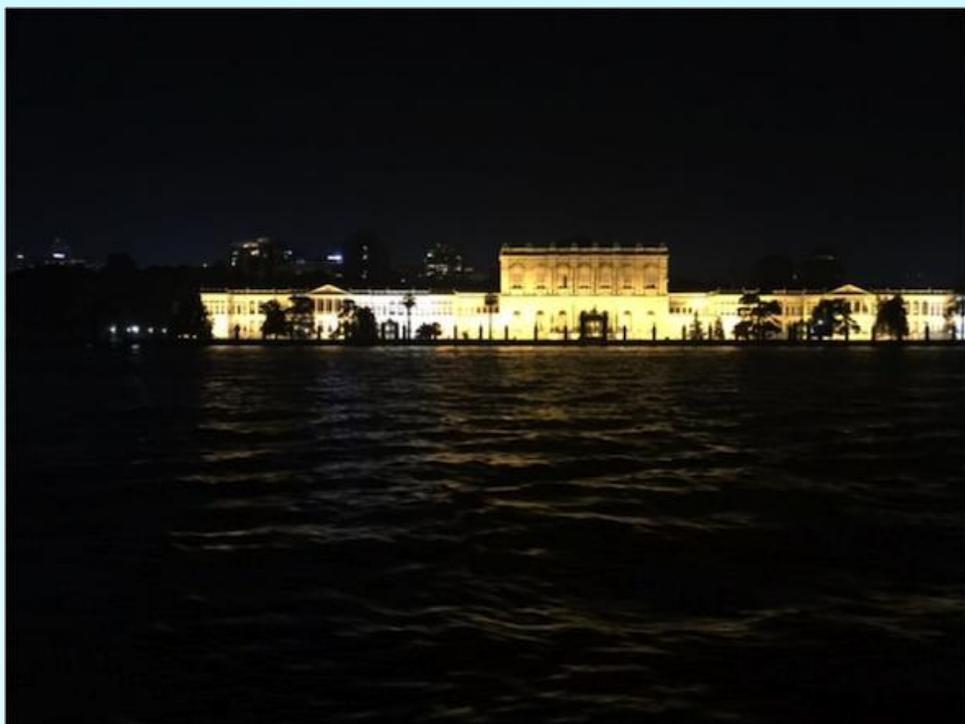
I am extremely grateful to the expertise of the ECRO Secretariat and the staff of the whole Organization for the financial support to join the conference. I am honoured to have been considered the right candidate to take part to this important scientific event with one of your travel grants.

Alberto Maria Cattaneo
Chemical Ecology Research Group
Fondazione Edmund Mach, Italy

Madlaina Boillat from ECRO 2015

The days spent at the ECRO meeting 2015 in Istanbul were extremely enriching for me. I just started my PhD in the Neurogenetics lab at the University of Geneva, where I study neural circuits controlling innate behaviors in mice. During the poster session I presented research showing that mice have an innate ability to detect and avoid sick conspecifics, and that this behavior is mediated by the vomeronasal system. It was very interesting to talk about my work with researchers from the field, sharing experience about the methods used as well as possible future improvements and perspectives. I received a lot of positive feedback on my work, which encourages me to continue in the same direction.

I also appreciated discussing with other PhD students and postdocs, about their research as well as about their experience regarding their host lab, their University or country. I learned a lot of things about other models that I'm not used to work with and new technologies and methods developed by people from the field. In general, the atmosphere at the meeting was very friendly and intimate. During the breaks and poster sessions it was easy to talk with people. As it was very warm outside, people gathered around a few tables in the shadow during lunch and coffee breaks, which was perfect to get in contact with other people.



The symposia were impressive. I was very glad see that numerous leading scientists from the field of chemoreception were attending the meeting and giving talks. It was great to discover the persons behind the research that I've been studying for a few years now. In all sessions there were very interesting talks, both from the most experienced professors and from young scientists. There were several presentations where the question of how an innate behavior can be modulated depending on the context and on the internal state of the animal was addressed, a subject that puzzles me particularly. For example, Thomas Bozza explained that the valence of a TAAR ligand that is capable of inducing innate avoidance or attraction in males is dependent on whether the receiver a dominant or a subordinate male. Linda Buck was working on the same odorants and showed how binary combinations of odorants with opposing valence influence each other's effect on the behavioral output. Iona Grunwald Kadow explained how in *Drosophila* a same cue can induce opposite behaviors depending on context: two independent circuits, one dependent only on the lateral horn ("innate behavior circuit") and one involving the mushroom body ("learned behavior circuit"), differentially process an aversive cue depending on the feeding state of the fly. I would like to thank the ECRO for supporting my venue to Istanbul with a travel grant and I also want to thank the organizers of this meeting. This was the first meeting in the field of chemoreception that I attended; I definitely hope that I'll have the opportunity to return.

*Madlaina Boillat, PhD Student
Rodriguez Laboratory
Dpt. of Genetics & Evolution
University of Geneva, Switzerland*



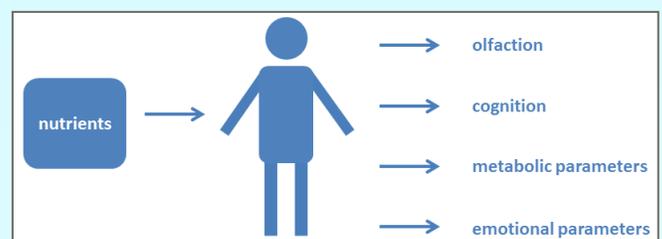
Melanie Denzer-Lippmann from ECRO 2015



My name is Melanie Denzer-Lippmann and I received the ECRO travel grant for the participation in the annual ECRO meeting, which was held in Istanbul this year. I am very thankful to the Polak Foundation and ECRO organizers who choose me for the ECRO travel grant and thus made my participation possible. As a PhD student in the working groups of Prof. Dr. Norbert Thürauf and Prof. Dr. Andrea Buettner at the Friedrich-Alexander Universität Erlangen-Nürnberg in Germany, my research is about human olfaction. I am especially interested in the influence of macronutrients on human olfaction, cognition, emotional and metabolic parameters. Further I am interested in developing innovative olfactory test systems for human testing.

The participation in the ECRO annual meeting in Istanbul was very interesting for me. I met some very inspiring people who are working on quite important and interesting research projects. For example Daniel Amir from Weizmann Institute of Science in Israel had a poster about "Body odor conveys information about trustworthiness". In a brisk conversation we talked about his research and the influence of his very interesting findings.

The keynote lecture from Robert Margolskee "Taste cells of the gut and endocrine cells of the tongue" was quite informative for me and my work because it gave me descriptive insights into the interaction of food intake, especially different application forms, and hormonal response.



In general the ECRO meeting was a platform for stimulating meetings and conversations with like-minded people.

A further highlight was the Young Scientist Symposium with Linda Buck and Stefan Fuss as chairmen. This symposium gave young researchers the chance to present their work in a few minutes in front of a big expert auditorium. Within this symposium Tali Weiss from Weizmann Institute of Science in Israel presented her data about the electrical stimulation of human mucosa. This stimulation could not generate olfactory perception but it alters the activity in the primary olfactory cortex. Thus her findings could be a novel minimally invasive path to deep human brain stimulation.

The poster sessions were also quite important for me because I was able to present a part of my data on my poster with the title “Effect of oral bolus versus sustained release application of nutrient solution on olfaction”. This presentation could lead to new research connections. Moreover I received innovative ideas for further research projects. Further within the poster sessions I was able to get in contact with researchers of my own field as well as different fields. Thus the poster presentation offers an informal chance to get into contact with other researchers of diverse research areas.

Moreover I received some new information even in research areas beside my own field. I learned more about Parkinson’s disease and its’ impact on olfaction and quality of life. Further I took some information about odorant induced behavior in zebrafish, which was quite interesting. In addition I received within talks, poster sessions and conversations so much valuable information from different research areas that I am not able to mention all of them.

The concept of parallel symposia was quite good because this gave me the chance to experience the conference in a more efficient way.

Additionally the general split of olfaction and taste within the parallel symposia was good and made it easier for me to choose the best fitting symposium.

Furthermore Istanbul is such a beautiful city. Having the chance to visit the Blue Mosque and other sights was a pleasure for me and encouraged me to visit this great city again.

Melanie Denzer-Lippmann

Nitzan Dubovski from ECRO 2015

Hello,

My name is Nitzan Dubovski, and I’m a MSc. student at the “Hebrew University of Jerusalem”, in Israel. My research is carried out by Prof. Masha Niv, at the Faculty of Agriculture, Food and Environment. The faculty is located in Rehovot. Our lab is interested in the area of taste research, and lately it also started to be involved with sensorial aspects. The topic of my research is “Taste compounds- sensorial and computational analysis and effect on mood and behavior”. As a part of my study, I’m examining effects of different taste compounds (for example: quinine, caffeine and sucrose) on psychological behavior of students. My assumption are based on the fact that bitter taste is aversive, because of its role as a warning signal against poisons, while sweet is attractive, for high-calorie food consumption. Thus, oral exposure to bitter taste should enhance negative emotions and a general aversive behavior, while exposure to sweet should cause the opposite effects. In the future I will also check the influences of polymorphism in the bitter receptors.

I want to thank you for your generous support! I was very happy and grateful to hear about this scholarship, and I appreciate it very much. Staying in Istanbul was very nice, the city and “Bogazici University” are lovely, and I hope to visit again in the future. The conference was a good platform for me to be exposed to other fields, such as smell. The lectures were very informative and enriching. Moreover I had the opportunity to talk with many experts in the smell and taste area, to present my poster in front of other colleagues, and to get more ideas and feedback for my research.



The lectures I enjoyed the most were about signal transduction – from receptors to perception. Until the conference I only knew how it works in taste, and now, with the new knowledge about this process in smell, I finally have the full picture, which helps me to understand better the whole procedure.

The conference is a great place to meet new friends. I met several students from “Weizmann Institute of Science”, who work with the same techniques and approaches on smell, at the lab of Noam Sobel. The funny thing is that “Weizmann” is also located in Rehovot, across the street from my faculty, but the first place we met was in Istanbul. The conference is a greenhouse for sharing and cooperating with students from all over the world.

In the last day of the conference we had the chance to visit the old city of Istanbul, we had a great time (see attached photo ☺)

I hope that I will have more opportunities to participate in conferences like ECRO. I truly believe that it contributes professionally and socially. I think that every advanced degree student should have this important experience during his studies. I want to thank you again for your generous grant, without your support it would be much harder to take part in this enriching conference.

*Nitzan Dubovski
Hebrew University of Jerusalem, Israel*



IMPORTANT NOTICE

How to submit your reports

Students and young scientists who have received a grant from ECRO to meet the expenses for a Conference, a course or a visit to another lab are requested to submit a short report, which will be published in these pages of the next issue of the ECRO Newsletters.

Purpose of the report

Such reports are mainly intended for other ECRO members and readers, who might get interesting information from the experiences of their colleagues. They should not be regarded as polite and formal duties to thank ECRO for the help received.

Length and style

Therefore, reports should be useful, written in a simple, concise, but informative style with facts and data, rather than just emotional feelings (although personal experiences and their impact on the scientific formation of the reporter are welcome). Some information about home institution, type of scientific background and personal interests are important to complete the report.

As an indication, a length of 500-600 words could be appropriate, corresponding to about one page of the ECRO Newsletter, but this is not a strict rule and longer reports are welcome, provided they are written in concise and fluent style.

One or two pictures, even if not related to scientific events, can make the report more attractive and are strongly encouraged.

Remember: The reports are NOT edited and get published as they are.

Forthcoming Meetings



ECRO XXVI - 7-10 September 2016 - Athens, Greece



We are delighted to announce that the next ECRO meeting will take place in Athens, Greece, on the 7th-10th September 2016. A Greek ancient pictogram inspired the logo of the conference (=olive oil, picture) and we hope that the local 3500-year old science, philosophy, traditional hospitality and food will provide the ideal frame for stimulating scientific discussions on chemoreception. The Venue is the Divani Palace Acropolis 5-star hotel, located literally at the heart of the ancient, neoclassic and modern Athens, just a few hundred meters from the Acropolis temples, ancient Agora and Acropolis Museum. In such a site, we have planned the Welcome reception on a roof with a breathtaking view to the monuments. You may also enjoy such a view, if you choose to stay in Divani or one of the nearby hotels that we will suggest on the ECRO conference website.

Nearby, you will find Plaka, the old Athens, famous for its charming narrow streets, taverns and shops.



The area is easily accessible by the underground subway, buses and taxi. Despite the fact of being very close to the busy center Athens (Syntagma), this cozy area around Acropolis is rather isolated so we are confident that you will feel comfortable, safe and spend a very agreeable time as the thousands of people who visit the area every year. And for a little escape from the city, the gala dinner and additional excursions will be organized by the seaside.

So, please note the date 7th-10th September 2016 in your calendar, follow the updates in the ECRO website dedicated to the Athens meeting (going live in a few days) and feel free to contact us for any information on the meeting event !

Looking forward to meeting you in Athens,

On behalf of the ECRO Board,

Marika Kapsimali

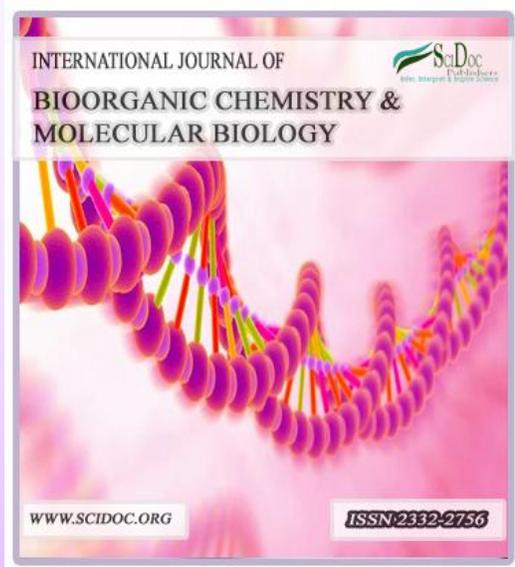
IBENS, Paris.

marika.kapsimali@ens.fr

Call for papers from...

International Journal of Bioorganic Chemistry and Molecular Biology

SciDoc Publishers Delaware



SciDoc aims at fast online Open Access publication covering all areas of Science, Technology and Medicine (STM). The “*International Journal of Bioorganic Chemistry and Molecular Biology*” (IJBOMB) has been established to accelerate and focus on the needs of natural scientists ready to showcase the progress made in their field of endeavour at the interface between chemistry, biochemistry and molecular biology. In our field of studies related to pheromone chemistry and insect olfaction, IJBOMB is presented as a good alternative to traditional journals such as *Insect Molecular Biology*, *Insect Biochemistry and Molecular Biology*, *Journal of Chemical Ecology*, *Chemo-Ecology and Chemical Senses*. Likewise, the journal is not restricted to insects, but is open for complete studies analyzing microbe, plant, animal and human systems as long as they combine both chemical and molecular data. Particular attention is given for studies with prospect of innovation in medicinal sciences.

This announcement is intended to associate with ECRO-ESITO, by developing sustained scientific partnership, and to bring together Scientists and Researchers in combating the most important world’s challenges by globally addressing them, through international collaboration.

SciDoc Publishers aims to work with scientific societies in exchanging ideas, meetings and experiences to promote knowledge among members and the rest of the scientific community. IJBOMB will be glad to provide publication support to the Organization.

In the hope to offer a full context for scientific breakthroughs, illuminate connections among disciplines, and present helpful tools for managing international research, we simply wish to remain a forum for open, constructive criticism and discussion of key scientific issues.

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Editor in Chief

Dean and Professor of Biology
University of Texas at San Antonio, Texas, USA
Biomedicine, Neurobiology of Disease, and Mechanisms
of Pathogenicity

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QILU University of Technology, Distinguished Professor,
College of Agricultural Sciences, Director
SAAS, Taishan Scholar and Outstanding scientist from
abroad, Jinan, Shandong Province, P.R. China

SciDoc Publishers
editor.ijbomb@scidoc.org
<http://scidoc.org/submission.php>



Promoting Flavor Research Amongst PhD Students

Academic Year 2015-2016

Last Date for Entries - October 31, 2015

FLAVOR AWARDS FOR PHD STUDENTS

DR. ANDY TAYLOR

Flavor is an essential ingredient in human food. It provides pleasure to millions of people in the world but, for the less fortunate it is also important; even starving people need emergency rations that taste good so they can ingest the necessary nutrients.

Although everyone experiences flavor several times a day, the technical aspects of flavor are not so well known. In reality, the flavor of the foods we eat today is the result of team work between expert chefs, chemists, technologists, psychologists and even neuroscientists. Good flavors require a combination of art, where chefs and flavorists create flavor concepts, coupled with a scientific understanding of the way people sense flavor through their smell and taste receptors, as well as the way the human brain processes these flavor signals. Measuring flavor using sensory and chemical methods is essential

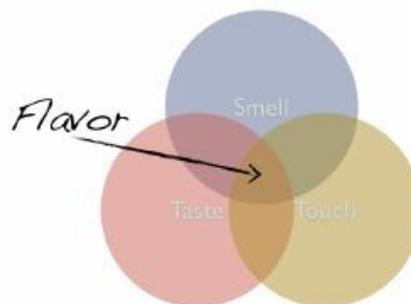
GIRACT FLAVOR AWARDS



PROFESSOR ANDY TAYLOR DESCRIBES AN INITIATIVE TO ENCOURAGE TALENTED YOUNG SCIENTISTS TO STUDY FLAVOR SCIENCE

in ensuring flavors are well-liked and safe for human consumption.

In Europe, the flavor industry employs thousands of people as well as contributing tax revenues to a variety of European countries. Maintaining the industry requires a supply of



skilled people and there are diverse opportunities for employment in the flavor industry. To apply skills to the flavor industry, some specialist training is needed but the supply of trained people is limited. This results in great competition between food and flavor companies to recruit these flavor specialists.



GIRACT was instrumental in getting together eight companies in 2010 who recognised that there was a need to attract talented chemists, technologists, psychologists etc. to study flavor sciences. To provide an incentive, Giract along with the eight sponsors from food and flavor industries, set up a competitive scheme to award one-off bursaries (3000 euros) to first-year PhD students studying a flavor related discipline. The scheme also offers an annual prize for the best PhD final thesis (5000 euros) to recognise the achievements of flavor students.

6 | year Bursaries - € 3000 each

1 Final Best Thesis Award - € 5000

**30 Bursaries, 5 Best Thesis Awards
till now**

So far, 30 bursaries have been awarded to students studying at universities around Europe and 5 awards offered for the best final thesis.



Dr. Johannes Kiefl (currently, Manager Applied Research - Symrise) receives the 2013/14 Best thesis Award from Dr. Andy Taylor, University of Nottingham

"It is great that Giract offers a platform to support the young scientist in the field. That's unique in Europe!" - Dr. Johannes Kiefl



Dr. Marielle Ramaekers (currently, Scientific Coordinator at EFFoST) receives the 2014/15 Best Thesis Award from Dr. V Krishnakumar, Giract

DETAILS OF THE APPLICATION PROCESS FOR THE 2015 COMPETITION CAN BE FOUND AT:

<http://www.giract.com/flavor-research-programme.php>

CONTACT:

Professor Andy Taylor

Andy.Taylor@nottingham.ac.uk



info@giract.com