

December 2016—January 2017



The Nobel week!

Arriving very late on Thursday evening to an unusually warm and dry December night in Stockholm one gets the sense of Swedish reserve. Of course the atmosphere changes the next morning with the first hit of Swedish culture – the Swedish hotel breakfast; complete with real knakerbrod. Of course when in the city of science during Nobel week what is the first thing one does? Well for me it was a short taxi ride to Solna and a visit to a technology company to talk about lasers; well one does have priorities as a scientist. 8.30 am on a Friday morning and I was met by the CEO and technical officers of Cobolt lasers to talk about applications and of course the obligatory coffee and cinnamon pastries (calorie count already over the daily limit by this stage!). An hour talking about shaping laser beams and a quick tour of the factory (a big clean room with lots of naked lasers!) and I was back via the metro to the Grand Hotel and a sudden dunk into the Nobel circus, which explodes in your face as you enter the foyer of the Grand Hotel Stockholm (a.k.a. Nobel central).

First things first; a game of 'spot the Nobel laureate' starts in earnest; interrupted by a quick dart to the Nobel desk to collect the coveted invitation letters and entry ticket and a few free Nobel posters (including the physics one about pretzels and bagels). A quick tweet and I was off to the (slightly) more economic hotel at the back of the grand to drop of the precious tickets, a quick change into the casual 'business suit' and then off in a taxi to the Embassy of the Netherlands to meet one of the Chemistry Nobel Laureates (guess which) and a free lunch. Of course the taxi (Tineke booked!) is delayed and we arrive after the Guest of honour – seeing only his personal driver polishing the car bonnet as we enter the embassy courtyard. Fortunately they delayed the start of the lunch for us ;) and we were still on time to be greeted by the Ambassador. Of course Ben is first to the buffet since he had a tough morning at a secondary school explaining to students why he was awarded the Prize and getting the kids excited about chemistry. A short lunch and a good chance to catch up with the Feringa family present en masse, Dutch scientists working in Stockholm and of course our Rector Magnificus (between tweets) was followed by dessert and a question and answer session with the Laureate. As usual even the tough questions did not throw Ben, who kept us waiting for the coffee with answers longer than my questions on a Thursday morning!

Lunch over, back to work! And after a short walk back to the hotel with the Rector Magnificus interrupted by urgent phone calls from Cyprus and where not, myself and the director head off to the local bespoke outfitter to collect our 'Smoking', a.k.a. long tails. There are two things that make this event an experience – the first is that tails are remarkably complex clothing architectures, the second is that I think I need to be more realistic about my dimensions when booking.L

A quick adjustment, a painful payment and we are off back to the hotel to get ready for the first Nobel event, a night at the museum starting with self-assembly at the Grand Hotel, a quick check that we didn't forget ID and then we jump on the Nobel transfer Bus for another short trip to the museum and a long queue after security to shake hands with the local dignitaries. Duty done it is straight to the Hapjes buffet and glass of bubbly and then mingle with the great and good of the Swedish scientific community and of course a few Nobel Laureates – and the chuffed feeling that all three chemistry laureates remembered my name; so no awkward introductions. Although the Dutch laureate seemed not to recognise me; not used to seeing me dressed properly I guess. Another chance to catch up with the Feringa clan of course and find out what Ben has gotten up to the last few days. A perfect opportunity also to troll the editor of Nature Chemistry, and the Dean, whom, despite the best efforts of the public transport system, managed to make it. Fortunately, the Swedes are not very keen on long speeches and in fact there were none. So once we had our fill and took the obligatory photos and selfies we drifted back to the hotel and, avoiding the temptation to join the Stoddart entourage's party room at the Grand Hotel, a relatively early night.



Saturday morning was free of events (except for the laureates who had to practice standing up and sitting down at the concert hall), which I took advantage of to get up early, finish corrections to a paper, and send it back (not to nature chemistry unfortunately) and to play Solomon with the Oral abstract selection for NCCC. Managing to just have a coffee for breakfast and avoid the Swedish breakfast was I think a case of courage being a momentary lapse of judgment. A text message to meet at 12.30 for lunch was responded to with a 'let's do normaal' – 11.30 and a short walk into the shopping district to a typical Swedish restaurant and a warm lunch; for me it was Rudolph sausage (well maybe not Rudolph but definitely a very well breed reindeer) on a bed of mashed potatoes that I think was more lipid than carbohydrate (calorie count about 2000 already).

So back to the hotel for the ultimate challenge of the weekend – getting into the Smoking single handed. 45 min after starting I was finally dressed when I received a friendly email from none other than Bert Meijer telling me he had arrived and asking if I needed any help; I think he guessed I was a bit cack-handed when it comes to dressing properly. Well I can say proudly that I got a guarded approval from the finally dressed ladies of the Feringa entourage round at the foyer of the Grand hotel followed by a quick tug and adjustment to fix my bow tie properly.



So another check for ID and the invitation card and we were off to the buses for the (again) short trip to the Concert Hall, the security check, and the climb to the highest balcony for a bird's eye view of the happenings below and a lot of standing up and sitting down. The entry of the Royal family was with fanfare but strangely also informal and friendly followed by the laureates present and past and the first of the several musical interludes from the excellent orchestra on the balcony. The award speeches in Swedish were a surprise and after a bit of collective confusion, everyone was busy digging out the program for the translation so we could follow the speech and chuckle at the appropriate points together with the locals.

The first award for Physics was poignant, but handled excellently by the organisation; pomp and circumstance in Sweden seems second always to doing the right thing. I am afraid though that even after the award speech I am still none the wiser as to topological doughnuts and pretzels. Then the highlight (for me at least), with the award of the chemistry medals. I think it is a trick of the mind, but I really got the feeling that our Dutch Professor got the longest and loudest applause. He certainly got the prize for being the kid of the group!

Then the Nobel prize for Literature, won this year by a songwriter who for whatever reason decided not to attend (I might mention that the prize was awarded to many of my countrymen, incl. Yeats, Shaw, Beckett...but I digress). The rendition of one of his songs in his absence was extremely moving added to by the nervousness of the singer. No one in the hall was in any doubt that it was deserved and as an Irishman I can concur that he follows a long tradition of poet Nobel laureates whose work often makes little literal sense but is filled with meaning nonetheless (bit like the physics one). In the words of Yeats, Bob has 'hurled the little streets upon the great' with his words.



So prizes awarded (we found out later that the boxes were actually empty since some recipients forget to take them with them in all the excitement – of course our Ben would never do that would he; ik zei nichts). Then off in a slinky bus (felt a bit like being on the 15 on a busy Friday evening) for another very short journey to the banquet venue. To say it was being held in a great hall is an understatement – it was a covered courtyard and packed with tables for the great and good attending. A quick check of the dinner seating plan (and then a helpful check for my less ocularly gifted colleagues), we squeeze through the melee to find our sets and await the royal entourage leading the Nobel laureates. I find my place (one should always know one's place) and sit down to face none other than the editor of Nature Chemistry – poor chap; another 4 h of being trolled by an Irishman. Luckily I was also seated beside a former chair of the Nobel committee who guided us through the evening and filled us in on all the details of the Nobel prize system (and when was the best moment to take an illicit bio-break). The more observant foreigners will notice that there is perfect gender balance; apparently I was supposed to make polite conversation with the lady seated to my left instead of trolling Stuart Cantrell and getting tips on when to empty my glass for a refill.

The main event begins with a fan-fare entry of the royal procession followed by the laureates and dignitaries – of

course in the best Swedish social tradition with Laurates accompanied by one another's spouses and princesses etc. The evening was begun with an amazing flute soloist and perfect lighting to build the necessary atmosphere and then two toasts – the first to the King, our host for the evening, and the second led by the King himself in perfect English to Alfrd Nobel. Fortunately the Swedish aversion to speeches was manifest throughout the evening and we could start with our 4 hour dinner, with each course separated by a musical performance each more spectacular and atmospheric than the last. Dessert over and coffee served we turned to the central staircase where students bearing the standards of the universities faculties and schools presented a salute as each 'senior' Nobel laureate stood to give a short speech beginning with an explanation of the physics Nobel prize involving donut shaped footballs; I remain none the wiser. This was followed by Sir Stoddart (the senior laureate in age) with a call for the collective nature of science to make itself heard and more about baguettes going through doughnut holes. At least I think I could follow that one. Unfortunately Bob Dylan decided not to attend but did communicate via a speech delivered by the Ambassador of the United States of America with eloquence but also sentiment that made it clear that they were his words. To paraphrase another American lyricist; there was not a dry eye in the house.

The speeches were rounded off with a speech from the winner of the Memorial Nobel prize in economics, that was both light hearted and touching; echoing Fraser's words with a reminder that one of his guests would not have been present had it not been for the bravery of the Swedish nation in rescuing Danish Jews on a faithful night in 1940 and that we need to be alert to such dark clouds on the horizon today. The speech ended on a lighter note, with a reminder that economics is a field that is more powerful and at the same time less powerful than we think it is – so I was at the same level of enlightenment as I was after the physics speech L

The formal part of the evening was ended with a serving of a local beverage and then we were lead in procession by local students dressed with blue and yellow sashes and each wearing a sailors beret – apparently they receive these when they finish their bachelor and each is unique to their faculty. Of course the procession was led by the king, the royal entourage and the laureates followed after a hiatus by the guests and family present up the grand stairs to one of the most impressive gilded dance halls I think I will ever see. At this point, the Swedish custom of switching from highly formal to highly informal was evident and the party started. The Nobel Medals and certificates were on display with that for Bob Dylan being the most photographed of course.

Fortunately I was too late for the first dance of the evening and could instead engage in laurate spotting and selfie snapping until the small hours. At around 1 some of us less capable skulked off back to the hotel to turn in, with the laurates and a sizeable number of the guests moving to the Nobel NightCap event organised by students – seeing the twitter feed (nature chemistry editors are handy sometimes) I am glad that I chose discretion over valour; the party ended at 6 am apparently.

Sunday morning is no time to lay in bed of course and up again at 7 to grab a (not so) quick Swedish breakfast and then a wave good bye to the director and Dean followed by a short walk to the Nobel museum through a now seasonally normal Stockholm (cold, snowy and windy). There is something a bit exclusive about being in a museum guided by the curator before normal opening hours – but it is the Nobel week so everything seems special, except for the slightly weak feeling due to certain oxidative transformations my liver seemed to be still busy with.

Duties done, a quick refreshing walk through Stockholm to the train station and a short journey on the Arlanda express to the airport. Party over, an afternoon to unwind travelling home? Nope, back to work with a message from the Scientific Coordinator to write this log for the newsletter – still it did allow me to relive a very special weekend. Ben I hope to return the favour some day!

Wesley Browne

Highlights by Prof. dr. Jan B.F.N.Engberts

- No doubt that the most important highlight in the history of the Stratingh Institute is the award of the 2016 Nobel Prize in Chemistry to Professor Ben Feringa. He will receive this most prestigious academic award officially in Stockholm on December 10 of this year. In a phone call on October 5, his well-deserved award was first made public and the whole laboratory was suddenly in a highly excited state of enthusiasm. We all knew that Prof. Feringa was performing highly creative scientific work of great beauty, recently focusing on molecular machinery. His work, and that of the other two Prize winners Jean-Pierre Sauvage and Fraser Stoddart, has been nicely summarized by David Leigh in a communication in *Angew.Chem.Int.Ed.Engl.* In addition, attention was also paid to the Nobel Prizes in Nature Chemistry and in Nature Materials. *Leigh, D.A., Angew.Chem.Int.Ed.Engl., 2016, DOI 10.1002/anie.201609841, Richards, V., Nature Chem.2016, DOI 10.1038/nchem.2687; Editorial in Nature Materials 2016, DOI 10.1038/nmat4820.*
- Araisamines are a family of exotic marine alkaloids that contain a dense array of functionality, high polarity, and a rich stereochemistry coupled with equilibrating topologies. A really great challenge for chemical synthesis. At the Scripps Research Institute, La Jolla, California, Baran and coworkers have now developed a remarkable synthetic procedure, containing a selective C-H functionalization and a surprisingly simple final step intersecting a presumed biosynthetic intermediate. The antibacterial activity of the products will certainly induce further studies. *Titan, M., Yan, M., Baran, P.S., J.Am.Chem.Soc., 2016, DOI 10.1021/jacs.6b09701.*
- The function of proteins in living cells can be controlled with complete specificity using small molecules. This is a great challenge, but a novel example (involving a small-molecule switch) was reported by Deiters and colleagues (University of Pittsburgh). A phosphine-mediated Staudinger reduction activated the protein function. A rather complex procedure was employed for the site-specific introduction of a small-molecule-removable protecting group into the protein of interest. A strategic placement of this group renders the protein inactive until deprotection by a biorthogonal Staudinger reduction delivers the active wild-type protein. A whole series of cellular processes was conditionally controlled by this methodology. *Luo, J., Liu, Q., Morihito, K., Deiters, A., Nature Chem. 2016,8,1027-1034.*
- In a joint project of the Universities of Shanghai and Melbourne, chemically asymmetric silica nanobottles (NBs) were synthesized containing a hydrophobic exterior surface (capped with 3-chloropropyl groups) and a hydrophilic interior surface for spatially selective cargo loading and for application as nanoreactors and nanomotors. The silica NBs, with an average diameter of 350 nm and an opening of about 100 nm, were obtained by anisotropic sol-gel growth in a water-n-pentanol emulsion. Selective loading inside or outside of the NBs can be accomplished. These NBs can be used as vessels for various reactions and also a high-performance nanomotor could be constructed by selectively binding catalytically active hydrophilic Pt nanoparticles inside the NBs. *Yi, D., Zhang, Q., Liu, Y., Song, J., Tang, Y., Caruso, F., Wang, Y., Angew.Chem.Int.Ed.Engl., 2016, DOI 10.1002/anie.201607330.*
- Metal-halide perovskites possess the formula ABX₃ with A an organic or inorganic monovalent cation, B a bivalent cation (Pb²⁺, Sn²⁺, or Bi²⁺) and X a halogen. They are employed as efficient and relatively low-cost energy light absorbers in solar cells. In a feature article in *Chem.Comm.*, Zhang and eight coworkers from Universities in

Australia, China and Germany review recent advantages in the synthesis of low-dimensional metal-halide perovskites and their novel optoelectronic and photonic applications. It is argued that combined efforts from chemists, material scientists, physicists and device engineers will be required for the successful fabrication of commercial products. *Zhang, Y., Liu, J., Wang, Z., Xue, Y., Ou, Q., Polavarapu, L., Zheng, J., Qi, X., Bao, Q., Chem. Comm., 2016, DOI 10.1039/c6cc06425f.*

- Langmuir published recently a special issue on nanobubbles (Vol.32, issue 43, November 1). Reviews were devoted to, among others, their stability, reasons for their size, shape, and stability, and their thermodynamics. Vincent Craig, with four colleagues from the Australian National University, Canberra, wrote a nice review on the history of nanobubbles. They argue that nanobubbles are thermodynamically never stable and one should always consider the rate of bubble dissolution. Bulk nanobubbles must be treated separately from surface nanobubbles since this reflects their separate histories. There is, however, progress in understanding the observed long-term stability of nanobubbles which is relevant for applications of nanobubbles in industry. *Alheshibri, M., Qian, J., Jehannin, M., Craig, V.S.J., Langmuir 2016, 32, 11086-11100.*
- Huang and a colleague from a University in Saudi Arabia reported a short review about non-classical C-H...X hydrogen bonding and its role in asymmetric synthesis. Non-classical hydrogen bonding (NCHB) is an interaction X-H...A wherein a hydrogen atom forms a bond between two structural moieties X and A, of which one or even both are of moderate to low electronegativity. The weakest of these NCHBs can be hardly stronger than a van der Waals interaction while the strongest ones can be stronger than weak covalent bonds. Their energies are usually in the range of < 4 kcal/mole. Unusual behavior can be observed because of the balance between electrostatic forces and repulsive interactions between proton donor and acceptor. Most attention has been paid to C-H...O interactions and these NCHBs can induce stereoselectivity in asymmetric catalytic reactions. A number of examples are discussed. *Ajitha, M.J., Huang, K-W., Synthesis 2016, 48 (20) 3449-3458.*
- In a highly interesting perspective in Nature Chemistry, Shaik and two coworkers (Hebrew University of Jerusalem) reports that oriented external electric fields (OEEFs) as “smart reagents” are no longer a theoretical dream. OEEFs possess a broad potential for controlling and catalyzing a variety of non-redox reactions and also impart selectivity at will. An OEEF along the reaction axis, i.e. the direction of electron reorganization, can catalyze non-polar reactions many times, control regioselectivity and induce spin-state selectivity. Moreover, the endo/exo ratio of Diels-Alder reactions and steps in enzymatic cycles can be controlled by flipping the direction of the OEEF or orienting the OEEF off the reaction axis. Theoretical results and experimental data are reviewed for a number of organic reactions. It is argued that OEEFs have the potential of becoming smart reagents and effectors of chemical reactions in the future. *Shaik, S., Mandal, D., Ramanan, R., Nature Chem. 2016, 8, 1091-1098.*

Jan Engberts

New Appointments



Balint Fridrich

As of 1/11/2016

PhD student

Group Barta



Ivana Maric

As of 1/11/2016

PhD student

Group Otto



Eleonora Diamanti

As of 16/11/2016

PostDoc

Group Hirsch

Werkbespreking: Thursday morning 8.30 hrs, room 5111.0080

December 15th— Tom van Leeuwen (PhD Feringa) Title to be announced - Topic: "Molecular motors"

December 22nd—Wojtek Danowski (PhD Feringa) "Photo and thermal isomerization of molecular motors in solid state"

January 12th—Niek Eisink (PhD Minnaard) "Regioselective carbohydrate oxidation: Scope, limitations and origin of selectivity"

January 19th— Shreyans Chordia (PhD Roelfes) "Genetic Optimization of an Artificial Metalloenzyme"

January 26th—Erik Pinxterhuis (PhD Feringa) "Highly Efficient Enantioselective Liquid Liquid Extraction of 1,2-Amino-Alcohols via SPINOL Based Phosphoric Acid Hosts"

February 2nd—Lara Villarino Palmaz (Postdoc Roelfes) "Supramolecular assembly of Artificial Metalloenzymes. Influence of the second coordination sphere of LmrR on catalysis"

February 9th— Ranajit Mondol (PhD Otten) "Moving away from d-block to p-block: Redox- reactions of boron-& aluminum-formazanate complexes"

February 16th— Liliana Cozzoli (PhD Roelfes) "Responsive DNA G-quadruplex micelles"

The traditional Stratingh Christmas Borrel will take place on Friday December 16th, from 16:00 in room 5116.0215.

If you have items for the next issue of this Newsletter, please send an e mail to the Stratingh Institute office: Stratingh@rug.nl