

water-soluble components to make them bioavailable. Crucial in this process are bile salts, which promote an enzyme called bile salt stimulated lipase to release fatty acids from the milk's triglycerides. This lipase is a natural component of breast milk but an equivalent enzyme also gets secreted in the infant's pancreas. In addition, the micelles of bile salts transport hydrophobic digestion products through the aqueous digestive system. But unlike in an adult, the concentration of bile salts in an infant's intestines is surprisingly low — so low that micelles are unlikely to form. Thus, it is rather unclear how infants manage to digest the triglycerides at all.

Stefan Salentinig and Ben J. Boyd, from Monash University, and colleagues have now shed some light on this puzzle. Using small-angle X-ray scattering on a synchrotron source along with cryogenic transmission electron microscopy, they investigate the digestion of breast milk *in vitro* while varying bile salt concentration and pH conditions. Their results are remarkable: within the breast-milk fat droplets, highly ordered structures similar to liquid crystals seem to form during digestion, even at low bile-salt concentrations. These structures are more water-like than the usual fat droplets. At the end of the digestion period, water even gets transferred from the aqueous environment into the droplet. The ordered structures represent an alternative carrier of hydrophobic molecules other than bile-salt micelles.

While ordered structures had already been found during the digestion of cow's milk, breast milk seems to bear the unique feature that the self-assembly process occurs without any additional lipase, only promoted by the bile salt stimulated lipase in the milk. The self-assembly process within fat droplets might be key to releasing necessary nutrients and ensuring an infant's healthy development, and may have particular importance for preterm infants whose digestive system is equipped with hardly any bile salts. *LM*

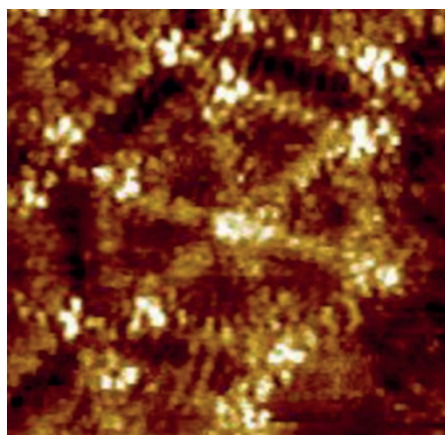
MOLECULAR WHEELS

Huge hexagons

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Synthetic chemists are always keen to push their discipline to the very limits, and making ever-larger molecules that have well-defined shapes and precise elemental compositions is one way to highlight just what modern chemical synthesis can achieve. Many chemists are also fascinated with cyclic molecules — an obsession that can almost certainly be traced back to benzene — and so the synthesis of giant

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macrocycles is a particularly appealing challenge. Beyond a certain size, even macrocycles made up of rigid hydrocarbon building blocks such as phenyl rings and alkyne groups show some degree of flexibility, but one way to make stiffer structures is to introduce spokes that connect the macrocyclic rim to a central hub.

Now, a team of researchers in Germany led by Stefan-Sven Jester and Sigurd Höger have made a large molecular hexagon — with a corner-to-corner distance of almost 12 nm — in which the outer rim is linked to a hexaphenylbenzene hub through six spokes. The synthesis, which relies heavily on Pd-catalysed couplings, begins by constructing corner units of the hexagon in which half of each adjacent edge of the hexagon are located *meta* to each other on a benzene ring. In the next step a spoke is added to the corner units between the two edge pieces and, after some selective deprotection chemistry, six corners — with free alkynes at the end of their spokes — are coupled to the central hexaphenylbenzene hub. Following deprotection of the two half-edges attached to each corner, the hexagonal framework is stitched together in yet another Pd-catalysed coupling reaction, this time between two alkynes on each edge.

The resulting molecular wheel is made up of 75 benzene rings and 96 alkyne linkers connected in various arrangements, and comprises a total of 1,878 carbon atoms and 2,682 hydrogen atoms. Although the NMR spectroscopic and mass spectrometric data are consistent with the proposed structure, the signals are quite broad in each case. More definitive proof of the structure comes from scanning tunnelling microscopy images, which show well-defined hexagonal wheels with features that correspond to the expected molecular structure. *SC*

Written by Stuart Cantrill, Stephen Davey, Leonie Mueck and Russell Johnson.

blogroll

The bad and the ugly

Misinformation abounds, but bloggers are setting the record straight.

Science is often misrepresented — in advertising, in popular culture, and even in the press — and sometimes the facts don't come out right. Ben Goldacre, who writes at Bad Science (<http://go.nature.com/WQbpph>), describes his frustration regarding misleading press releases about scientific research. Indeed, it appears that sensationalism transcends all reporting disciplines. In an editorial (<http://go.nature.com/1BxZLD>) in *The BMJ*, Goldacre addresses the issue of improving accountability in academic press releases.

Meanwhile the ever-watchful eyes of See Arr Oh, the pseudonymous blogger behind Just Like Cooking, caught a more whimsical example of bad science. The popular TV show *Always Sunny* aired an episode featuring some structures that eschew typical understandings of chemical bonding (<http://go.nature.com/Ulastx>). See Arr Oh posits that “perhaps these ‘scientists’ should win a Nobel,” while coining the term “Wyoming nitrogen.”

There's been a fair amount of recent discussion about how science is portrayed in respect to advertising decisions. Are terms like ‘non-GMO’ and ‘all-natural’ inherently loaded? Chad Jones, blogging and podcasting at The Collapsed Wavefunction, argues that while the intent of health ‘fads’ may be noble *prima facie*, they often devolve into dangerous pseudoscience (<http://go.nature.com/6zxoBh>). When hard facts come up against public relations, the facts are all too frequently abandoned.

On a final note, See Arr Oh, along with the rest of the chemblogging community, bid a heartfelt farewell to long-time contributors Carmen Drahl of *Chemical and Engineering News* and Paul Docherty of *Totally Synthetic* (<http://go.nature.com/3pwUGw>). Both Drahl and Docherty, without a doubt, helped to shape the chemistry blogosphere for the better while it was still in its infancy.

Written by Mitchell Antalek, who blogs at <http://unemployedchemist.com>