

<http://scienceblogs.de/lindaunobel/2009/07/01/ordering-the-best-appetizer-platter-harold-krotos-many-passions/>

Nobelpreisträgertreffen

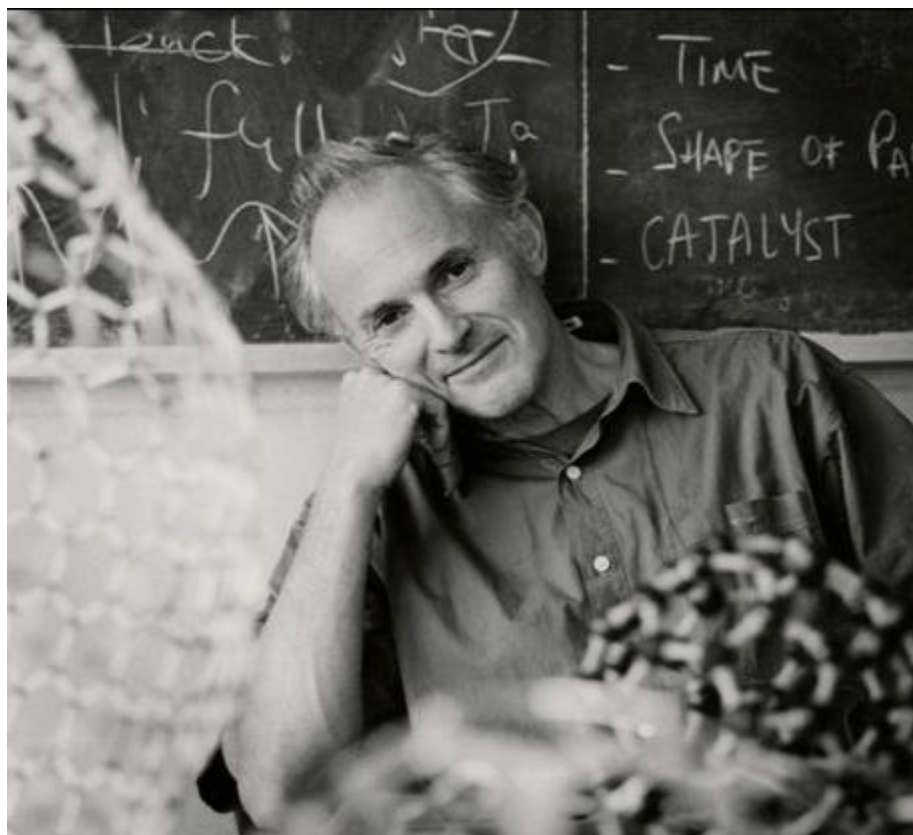


### **Ordering the best appetizer platter: Harry Kroto's many passions**

Veröffentlicht von [Ashutosh Jogalekar](#) am Juli 1, 2009

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When I visit my favourite restaurant for lunch or dinner, I usually order a legitimate food item from the main course. But once in a while, just to indulge, I order a sample platter of appetizers. The appetizers don't always provide the

deep satisfaction that I get from eating a proper, expensive food item. But they provide me with a different kind of unique satisfaction; they give me a glimpse of what's new, what's possible. They provide a view of the diversity that can emerge in a plate of bite-sized chunks. And through their frequent novelty, they give me hope that there are new possibilities on the horizon. These appetizers constitute occasional but necessary fodder. Sir Harold Kroto's talk was one of the most satisfying platter of appetizers I have sampled, and I had not even ordered it.

Sir Harold exemplifies the British intellectual tradition at its best. He has three passions; science, education and humanism. And in a wonderfully entertaining talk filled with animation, quotes, videos and wit, he exemplified all three qualities. And of course no talk is ever really interesting without being a little provocative, so there was plenty of that too.

Harry Kroto shared the Nobel Prize in 1996 for discovering a chemical structure that has become a cornerstone of our scientific imagination in the same way that DNA has. The fullerenes that he, Robert Curl and Richard Smalley discovered have symbolized scientific discovery. The myriad odd structures emerging from these structures including carbon nanotubes give us the hope of novel technologies in engineering and medicine. Since his discovery of buckyball in 1985, Kroto has turned toward other endeavors. He has strived to make his beloved science accessible to those who would most benefit from it, namely children around the world. To do this he travels all over the world and organizes local groups in developing and developed countries who teach children about science.

Kroto believes that science should always be presented in an attractive way for it to become truly appealing. To this end his talk reflected this style. Each of the slides was highly pictorial, filled with rapid animation, videos and quotes, exactly the dose of inspiration and fun that a roomful of 500 excited science students and young researchers needed. The talk began with an exposition of "chemistry in 30 seconds". It must have been a module that Kroto and his team designed for students; starting from simple numbers and figures Kroto derived the periodic table on the screen. The next few slides explored molecular flexibility, an important consideration which is paramount in the biological activity of drugs for instance. Kroto's own speciality- microwave spectroscopy- examines this phenomenon and was key in the discovery of fullerenes. Kroto's story is the quintessential story of serendipitous scientific discovery. His real interest was the study of molecules found in outer space. One day during this exploration he and his team accidentally discovered a peak in their spectrum, something that they were not looking for. Today a PhD. advisor may severely reprimand a graduate student if he tries to assign a chemical structure to a single signal in a complex spectrum. But Kroto and independently Smalley and Curl investigated this anomaly. As they say, the trick in science consists of seeing what everyone sees, and thinking of what nobody thinks. The rest is history, although Donald Huffman and Wolfgang Krätschmer had to synthesize fullerene in measurable quantities to meticulously characterize it.

After encapsulating chemistry in 30 seconds, Kroto moved on to the topic of science education. Some of the brightest children in the world are the most pressed for access to scientific knowledge. As I write this and look at the young scientists and bloggers around me, I ask myself, "What if we had been born in Somalia, or the DRC, or El Salvador, or a tiny village in China or India?". We each have to realise that most of us are privileged in doing what we do not just because of our own intrinsic capabilities of learning but because of fortunate circumstances, educated parents and plain old good luck. We should continue to remember that there are kids brighter than us, kids who potentially could make Nobel Prize winning contributions, who don't have the tiniest chance to climb the ladder of education. We owe it to ourselves to make sure if we can, to invest a tiny amount of effort in our own way to educate those who have not been fortunate to educate themselves.

To achieve this, Kroto has started the Vega Science Trust which seeks to communicate the value of science and common sense thinking to children in poor countries. In this respect Kroto is not a general who dictates from the sidelines. He is a foot soldier who is out there in the field. Photographic evidence of this fact came from several photos of Kroto teaching science to children in Mexico, Florida, China and Africa. The children were wearing t-shirts that were proudly emblazoned with fullerenes. The teaching of science extended to the spiritual; "fullerene meditation" in which children balance fullerenes on their heads while adopting a state of quiet contemplation. Kroto also emphasized the importance of the three bastions of modern information access, Google, Wikipedia and Youtube. All three constitute important forms of information access for millions of people in the future. Especially Wikipedia is a tremendous example of the remarkable wealth of high-quality knowledge and intense interest that individuals have in contributing to it.

The Vega Science Trust also has a really great [website](#) which has free access to interviews with Nobel Prize winners and other scientists, lectures by famous scientists (including a fantastic set of four one-hour lectures by Richard Feynman) and many other science resources. I have listened to several of the interviews and talks on this site and they do an admirable job of inspiring young people to study science.

However, educating children is not just educating them about science, because science itself is not simply about facts but about a process of constant questioning and revision. Sir Harold's third passion, humanism, firmly rests on the pillars of open criticism and inquiry that exemplify science. Humanism is not necessarily a rejection of religion, but it is an active and relentless emphasis on critical thinking, equality and skeptical thought.

Here is where the talk became provocative because when you start talking about impediments to learning you inevitably have to mention religion. The science-religion controversy is so widespread that you think that everything possible that one can say about it has been said. However Kroto focused on some key aspects. He was categorically

clear that children should not be indoctrinated with their parents' religion and taught that that is the only "right" one. Kroto has spent more than a decade teaching children to be inquisitive, critical and open-minded. Religious indoctrination of children will undo much of what he has been trying to do. But for Kroto the issue goes much further. Religious indoctrination is part of many different environments that the child inhabits. To make his point Kroto showed pictures from the odious creation "museum" in Kentucky, with saddled dinosaurs and with children shown the "evolution" of the earth over the past 6000 years. Even religious moderates should find this spectacle ridiculous. Richard Dawkins has called parents bringing up their children in their own religious tradition as engaging in "child abuse". While one might debate the merits of such a strong statement, there is no doubt that parents of all stripes must teach their children the value of open exchange and critical thinking.

But why? Why constantly stress the value of scientific thinking? Because otherwise our future generation would not be able to make the contributions that scientists at Lindau have made, and they would not be able to reap the benefits of these discoveries. The current flood of students at Lindau might well dwindle down to a trickle. We depend so intimately on continuous scientific discovery that we largely take it for granted. Too much of the science-religion debate ignores the simple fact that science has led to an enormous reduction in the amount of suffering in our world. As just two examples, Kroto quoted the discovery of anesthetics and penicillin, two discoveries which were watersheds in the amelioration of human disease and suffering. Whatever the positive and negative qualities of religion, the positive qualities of science should be apparent to any person. And it is only through the constant application of critical thinking and healthy skepticism that we have bequeathed the fruits of scientific wisdom.

Thinking about critical thinking and a balanced outlook takes us to the last point that Kroto discussed, and that was the absolutely crucial need for sustainable development. The same rational thinking that has led us away from superstition should also lead us to realize the grave danger that our activities pose to our planet, and the urgent need for prompt and cogent action. If we don't take care of our planet, we would not be able to take care of ourselves and nothing would matter then; not fullerenes, not education and not the science-religion debate. All that would matter would be the throes of a helpless species which could not prevent its own destruction. For a species which has sequenced its own language of life, sent men to the moon, plumbed the depths of its planet and defied nature by extending its own survival and life-span by leaps and bounds, we owe ourselves more than that.

Albert Einstein once said that *"all of science measured against reality is primitive and childlike- and yet it is the most precious thing we have"*. This is another profound realization that is frequently lost in the science-religion debate; that science makes no claim to ultimate truths (notwithstanding the utmost self-confidence that some of its practitioners may exhibit) but it has been supremely useful in gradually helping us know and get rid of our biases; as Niels Bohr said, the rather unpretentious goal of science is the gradual removal of our prejudices. To this extent science should be the epitome of modesty. We should be humbled and reminded of our own tiny little space in the universe whenever our eyes stretch across the vast milky way or whenever we view the sheer diversity of the species that populate a rain forest and recognize the deep and intimate relationship we share with these creatures.

At the same time we should feel supremely privileged that science, with the simplest of lessons, has allowed us to transcend our dreams in ways that have been possible for no other species on our planet. Science is not perfect, but the values of open-mindedness and skepticism that it has taught us have not only allowed us to make the world a better place through practical discoveries, but have also engendered the most basic elements of humanity, including a respect for free and open minds that is independent of nationality, gender, race and language. The Lindau meeting proves that science transcends every kind of barrier like no other endeavor. This rare realization, this most unifying of paradigms, is indeed a thing of limitless value. The most precious thing that we have.

Stichworte:[education](#) [Kroto](#) [religion](#) [science](#)

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Sie sich auf Evolution konzentrieren wollen, warum nicht an dieser Stelle, unter der bekannten Adresse (obwohl, allzu bekannt ist sie wohl gar nicht). Wie gesagt, (mediale) Unbildung, wohin man schaut