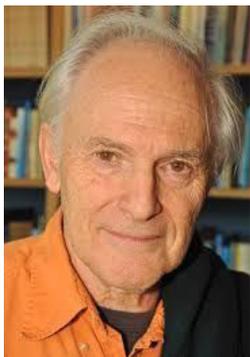


# Professor Sir Harold Kroto

born October 7 1939, died April 30 2016



This short note is an opportunity to celebrate the life and work of ‘Harry’ Kroto – a Chemist – who died early in 2016. His passion for science education is well known and particularly relevant to readers of this Journal since he gave the opening plenary lecture to the First International Conference for Science Education held in Cartagena, Columbia in 2009 in celebration of the 10<sup>th</sup> anniversary of its publication. The title of his presentation was “Global educational outreach in the GooYouWiki World (GYWW); the last chance for survival of an enlightened world”. The following abstract of his paper shows his enthusiasm for the use

of the internet to engage people in science education and more especially to support science teachers:

“All advanced technologies are double-edged swords, with great promise for good but also great potential for harm. It is not at all clear that our political leaders have the necessary wisdom to govern in a 21st Century so precariously balanced on Science, Engineering and Technology (SET). Much better Political and Public Awareness and Understanding of Science and Engineering etc (PPAUSE) will be necessary to realize both the humanitarian possibilities of SET and impose the limitations that will safely constrain the dangers of our technologies. The present level of ignorance of SET is a recipe for disaster. After all – “Although good decision-making cannot guaranteed by knowledge, common sense suggests that wisdom is an unlikely consequence of ignorance”. When the printing press was invented, it enabled anyone to write a book and everyone to read it, thereby catalyzing intellectual creativity as well as general access to the collected wisdom of mankind. Thus the mass-produced printed book brought about the first revolution in general education. In an analogous way, the birth of the Internet has led to the second educational revolution by the democratisation of broadcasting. The anti-educational stranglehold of audio-visual communication that the mainstream TV channels have had until now has been broken as individuals can now make and broadcast programmes and they can be accessed by anyone at any time. Some years ago I set up ‘The Vega Science Trust’ to create a platform for expert scientists and engineers to communicate directly on issues that interest and/or concern them. Vega ([www.vega.org.uk](http://www.vega.org.uk)) is streaming science lectures, interviews, discussions, workshops as well as careers programmes – in fact programmes on a wide range of issues – all free on the Internet. 75 of the 200 available programmes were broadcast by the BBC. (Note: Unfortunately the Vega Trust ceased operation in March 2012, but the material produced until that date still remains available.) A new, less expensive initiative, Global Educational Outreach for Science, Engineering and Technology (GEOSET) - has been initiated at Florida State University. The searchable gateway site is at [www.geoset.info](http://www.geoset.info) and the local site at [www.geoset.fsu.edu](http://www.geoset.fsu.edu). Several science strands are now streaming via these sites in a dual window format consisting of a video coupled with synchronised, downloadable, supplementary material (e.g. powerpoint images etc). Special presentations have also been streamed to the UK(x6), Iceland, Venezuela, San Francisco (x2), India and Germany and these are now streaming permanently. GEOSET is also assembling a cache of presentations by young researchers explaining their science in order to communicate the excitement of science to young people at schools. Furthermore the URLs of these presentations are now forming a key component in their CVs enabling them to find employment more easily. We are pioneering new ways of using the Internet to encourage the next generation of young people to work together to address some of Humanity’s most pressing problems. After all if the future is in anyone’s hands it’s in theirs. Our efforts have initiated a worldwide chain reaction as universities in the US, UK, Japan, New Zealand, Australia, India and China have joined or have agreed to collaborate by creating localised nodes in the GEOSET network. In this way GEOSET is harnessing the creative potential of individual educators all over the world. It is a programme that recognises the fantastic potential for shifting the paradigm of the educational process that the GooYouWiki-World (GYWW), born

at the start of the 21st Century, has brought about. The primary focus will be to empower teachers worldwide by giving them access to the very best teaching materials, packaged for their direct use in the classroom. New inexpensive recording technology allows us to create effective teaching programmes and make them available cheaply and globally. Wherever there is TV the Internet can also reach and provide teachers with the educational weapon they need to combat ignorance.”

Sir Harry is perhaps best known for his work that won him the 1996 Nobel Prize for Chemistry, jointly with Robert Curl and Richard Smalley, for their discovery in 1985 of fullerenes, popularly known as “bucky-balls” – new forms of the element carbon in which the atoms are arranged in the form of a ball. Indeed, subsequently, many of his inspiring chemistry workshops across the world had children/students building models of the structure of C<sub>60</sub>, known as buckminsterfullerene. A short autobiography can be found online at [https://www.nobelprize.org/nobel\\_prizes/chemistry/laureates/1996/kroto-bio.html](https://www.nobelprize.org/nobel_prizes/chemistry/laureates/1996/kroto-bio.html) and this provides an insight into his parents’ escape to England in 1937, his early education and more details of his professional life. He was a passionate humanist and the following quotations (taken from <http://www.kroto.info/quotes/> give a flavour of his motivations;

“Scientists have a responsibility, or at least I feel I have a responsibility, to ensure that what I do is for the benefit of the human race. It is important that we try to point out facts to help those in power to make decisions. Unfortunately, this is not often the case. Although knowledge cannot guarantee good decisions, common sense suggests that wisdom is an unlikely consequence of ignorance.”

“The humanitarian philosophies that have been developed (sometimes under some religious banner and invariably in the face of religious opposition) are human inventions, as the name implies – and our species deserves the credit. I am a devout atheist – nothing else makes any sense to me and I must admit to being bewildered by those, who in the face of what appears so obvious, still believe in a mystical creator.”

“My advice is to do something which interests you or which you enjoy (although I am not sure of the definition of enjoyment) and do it to the absolute best of your ability. If it interests you, no matter how mundane it might seem on the surface, still explore it because something unexpected often turns up when you least expect it.”

Clearly these ideas are provocative and need to be explored within each personal context. However, for those of us who have been, like Harry of to be able to work (and get paid) for something that we really enjoy, we can appreciate Harry’s encouragement, when he was President of the Royal Society of Chemistry, – “Do science because it gives you satisfaction, then hard work doesn’t seem like hard work.” (RSC News August 2016 p10.)

Alan Goodwin

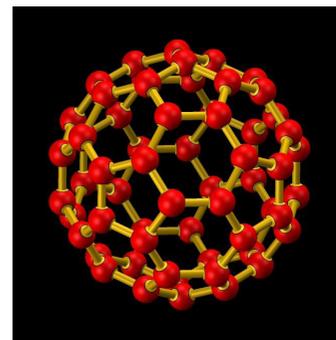


Fig. 2. Structure of fullerene

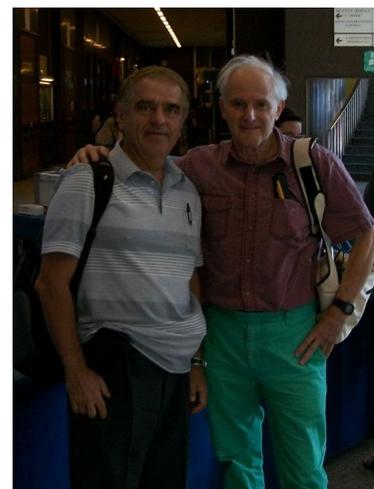


Fig. 3. Invited to the International Conference of Chemical Education, Rome, 2012. ( on the left- Yuri Orlik, director of the JSE)