

# George A. Olah's almost never-ending journey to the origin of life



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Date: June 21, 2023

The Hungarian-American George Andrew Olah (1927-2017) was awarded the Nobel Prize in Chemistry in 1994 for breaking a scientific taboo: he was able to prove that one carbon atom can bind not only four but five to seven other atoms. Although unspectacular to the general public, Olah's groundbreaking research could lead the world out of the CO<sub>2</sub> emergency. Olah's research laid the foundation for the energy carrier green methanol, which is renewable and non-polluting – Silvio Bonzanigo

«Csak nem hiszemell!» («I just can't believe it!») the tall, 17-year-old young man expressed his indignation at home after a walk through Budapest. A year

later he will graduate from high school from the Catholic school of the Piarist Brothers. Literature, foreign languages, philosophy and history dominate the

lessons, natural sciences enjoy less emphasis. On 22 March 1944, what György András Oláh simply does not want to believe – despite seeing it with his very own eyes – is the rounding-up of Jewish fellow citizens by the Hungarian gendarmerie and the German military. As the son of Jewish parents, Oláh has every reason to be suspicious of what he is experiencing. He does not know at this moment that a year later he will have to flee with his parents from one house to another to escape the hunters, that his older brother Peter will meet his death and that he will only be lucky enough to live through the end of the war unharmed. Years later Oláh is still only able to describe these last months of the war in summary form: «I do not want to revive this period of these monstrous, traumatising experiences.» Although Oláh escaped deportation to Auschwitz or a transfer as a forced labourer to the

German Reich, there is no way he could have imagined an orderly student life. Instead, after the end of the war, he clears rubble from Budapest's streets and helps push the piano around in the opera house to earn a living. Finally, the son of a judge decides to study chemistry at the Technical and Economic University of Budapest. He is fascinated by the breadth of research subjects and the proximity of chemistry to the elementary processes of life, although Oláh does not remember having any special interest in chemistry during his secondary school years. His first practical experience of chemistry was with an experimental kit given to a schoolmate as a Christmas present. Oláh is able to read literature in Latin, speaks fluent German and some French. Because of his extensive humanistic education, he was later called «The Renaissance Man» in scientific circles.

## Visiting the White House and Stockholm

«I really can't believe it!» George Andrew Olah – as his name is now after many years in the USA – must have thought again when the telephone rings early in the morning on 12 October 1994 at his home in Los Angeles. The caller is the secretary of the Royal Swedish Academy of Sciences, and he asks Olah in the proper manner whether he is prepared to accept the undivided Nobel Prize in

Chemistry. Not only the nominee himself, but especially the Rector of the University of Southern California, Steven Sample, is overjoyed on this day: Never before had one of their professors been awarded a Nobel Prize. After many congratulatory addresses and an invitation to the White House, where Vice-President Al Gore receives the honoured, King Carl Gustav XVI presents

him with the certificate of honour on 10 December 1994. Salo Gronowitz, the laudator of the ceremony, awarded Olah no less than the merit of having founded a complete revolution in the scientific research of carboration.

In the years between 1945 and 1994, Olah undertook what he described at the award ceremony in Stockholm as «a long and arduous journey which sought to implement a simple idea: to capture the harmful carbon dioxide and develop useful fuels and products».

## The balcony laboratory

Olah's journey starts at the Faculty of Technology and Economics of the University of Budapest. Because laboratory space is scarce in the war-torn city, the vast majority of first-year chemistry students are mercilessly selected by exams. Once again, Olah is not only one of the survivors, but one of the best. He teaches himself many things during long hours in the university library in self-study. He is also interested in lectures in history and philosophy, he's the goalkeeper of the university football team and is successful in several other sports. At the age of 22, Olah completed his studies with Geza Zemplén, including a doctorate, and in 1949 became assistant professor under him.

In the same year Olah married Judith Lengyel, his childhood sweetheart and later institute secretary. «That was the best thing that happened to me in my life,» writes the Nobel Prize winner charmingly in his later years. «Judith probably thought she had to save me

from a lonely professorial life that knew nothing outside chemistry.»

In the post-war years, Olah tries to conduct his own research with modest means. Unexpectedly, Zemplén meets his wish to set up an open-air laboratory on the roof terrace of the faculty building. Here Olah's first research on fluorides and Friedel-Craft's reactions takes place. Soon Olah begins to publish, attracts attention in the scientific community and unexpectedly receives a cylinder of boron trifluoride from the German chemist Hans Meerwein. «What a precious gift that was,» he later notes. The pungent smelling gas serves as a catalyst for a variety of chemical reactions.

But the centralist stranglehold of the Soviets, who have been directing things in Hungary as the new rulers since 22 December 1944, also affects science. Olah can give himself and his small team of researchers in organic chemistry some freedom in temporary laboratories, but the future for free research seems to be barricaded. The plan to leave Hungary

is maturing. The brutal suppression of the Hungarian national uprising in 1956 makes the Olah family, which in the

meantime has grown to three members, implement the decision, as 200,000 other young Hungarian intellectuals do.

## Dow Chemical as a springboard to the academic Olympus

Via London, the family reached Sarnia in Canada in spring 1957, where the American Dow Chemical had built a new laboratory. Two of his closest research assistants from Budapest followed Olah here. His wife Judith, who in the meantime had also studied chemistry and joined his research team, now looks after his two sons George and Ronald. Dow Chemical is a major user of carboration processes. Olah's research is now also oriented towards the needs of industrial applications, but he also has the freedom to pursue his own projects. He becomes the first scientist and researcher in the company.

In 1965, Olah was appointed professor and chairman of the chemistry department at the University of Cleveland in Ohio. This marked Olah's return to basic research. His team expanded rapidly, and his wife Judith was

again among them. Olah brings together individual institute units to form organizations with research powers. Olah describes the years in Cleveland as his most productive and he documents them meticulously. At the end of his scientific career, he counts 1,500 scientific contributions, 160 patents and 25 book publications for which he was responsible. He was awarded 15 honorary doctorates, became a member of all scientific chemistry academies and a research prize was named after him. «He was a true hero of chemistry» is the verdict of his successor as head of the Loker Hydrocarbon Research Institute in Los Angeles, California. Olah accepted the call of the university there in 1976 and – financed by the patronage of the Loker couple – was able to move into a new building constructed according to his needs.

# An esteemed educator

However, Olah's younger son Ronald had been the inspiration for this relocation, because he wanted to study at Stanford University, California. As a committed family man, Olah did not ignore this wish. And again, part of Olah's team followed him from Cleveland over 3000 km across the USA. Olah does not only know how to promote research careers, he also has the little-known gift of living in high esteem for employees at all levels, and he considers even his Nobel Prize to be above all a recognition of the 250 students he had led to degrees. Olah is investing part of the prize money in the Loker Institute. His pedagogical skills as

a university teacher can be seen from long passages in his autobiography and from short interview sequences: To an impatiently questioning interviewer of an American radio station, he not only wants to explain the outstanding advantages of methanol, but he tells him the history of mankind's use of energy since the fire in the cave. Olah illustrates the difference between ethanol and methanol not in chemical formulas but in the production of Russian vodka from grain. Trust instead of pressure is his credo when dealing with his students. And he always felt personally responsible for their failures.

## Georg Olah's life and research journey

### Thinking outside the box

198 cm tall, the office door always kept open and equipped with a booming bass voice of unmistakably Hungarian timbre and a great deal of humour, Olah remained an exceptional phenomenon in the academic world throughout his life. But his reputation stems even more from

his constant commitment to unconventional research. A special talent is not necessary for chemistry, he says provocatively, but the ability to think «out of the box» and recognise the unexpected in its meaning. The safe and well-trodden paths as a researcher are

repugnant to Olah, he does not like to sit out controversies in silence, and he never holds back with this opinion. In his autobiography, he therefore formally apologises for having occasionally disregarded the rules and established knowledge of the discipline and for having failed to respect his colleagues. The unknown acts like a magnet on Olah, and he always gets involved, regardless of whether his research promises any benefit. He constantly crosses the line between basic and applied research, and attributes this to his eight-year history at Dow Chemical. The fact that many postdoctoral students seeking employment in the chemical industry are

looking for a degree at Olah is the other side of his unconventional research habitus. Olah's team is his scientific family, as he calls it; the mutual interaction is unrestrictedly collegial and respectful; his weekly team meetings, which were not very common at the time, became legendary; Olah considers them indispensable for research success. In addition, Olah's early criticism of fossil energy production attracted unfriendly attention from the powerful oil and gas industry in the USA. This is probably one of the reasons why Olah never reaches the top league of universities: Stanford, Harvard, Massachusetts Institute of Technology.

## Research on the origin of life

Olah prepares meticulously for the time after the Nobel Prize. The 67-year-old is determined to avoid the danger of losing his enthusiasm for research afterwards. And he probably has the greatest humiliation in his scientific life to deal with: After almost 30 years of support, the National Institutes of Health (NIH) withdraw financial grants from him, just a few months before the Nobel Prize is awarded.

Relevant research results can no longer be expected from him because of his age, according to the succinct explanation. The fact that the NIH then effusively congratulate him on the Nobel Prize is considered a mockery by Olah. In

the final chapter of his autobiography [«A Life in Magic Chemistry»](#), which is full of anecdotes, Olah comments in detail on age discrimination in research and society. In fact, Olah once again – spurred on by this decision, which he finds incomprehensible – turns the research screws. The insight that fossil resources will one day be exhausted and that the rapidly growing world population will accelerate this deterioration even more, consequently outshines all the objectives of his work. The fact that methanol, although an ideal energy source, still requires coal, natural gas or crude oil for its production leaves Olah no peace.



The plan he has drawn up for an actual methanol cycle envisages something else, namely the production of methanol from hydrogen and CO<sub>2</sub>. In this cycle, CO<sub>2</sub>, which is harmful to the atmosphere but also to human beings, becomes the new energy source. Global warming can be slowed down, air purity can be increased, the consumption of fossil fuels can be stopped and the availability of energy can be extended indefinitely. The squaring of the circle, the egg of Columbus, the breaking of the Gordian knot – no metaphor would be presumptuous for this titanic project to provide the world's population with a pollution-free energy supply. In the production and use of green methanol,

Olah sees a return to the origin of life. «Main bas vishvaas nahin kar sakata» («I just don't believe it») – this is how the Indian-born Surya Prakash, Olah's successor as head of the Loker Institute, will have felt on 8 March 2017 when Judith Olah announces the passing away of his long-time mentor. The New York Times dedicates an extensive [obituary](#) to George Andrew Olah on 12 March 2017.