

Albert Szent-Györgyi and the Nature of Life

by Jane A. McLaughlin

Albert Szent-Györgyi was one of the leading scientists of the 20th century, recognized as such by a Nobel Prize early in his career. From an early age until his death at age 93, he sought an understanding of the processes of life.

He was born in 1893 in Budapest, Hungary to Miklos and Josefine (Lenhossek) Szent-Györgyi. One of his uncles, Mihály Lenhossek, a physician who did research at the tissue level, was influential in his later choice to attend medical school. Albert would become the fourth generation of Szent-Györgyi scientists. In his 1963 article “Lost in the Twentieth Century,” he wrote, “I must have been a very dull child. Nothing happened to me. I read no books and needed private tutoring to pass my exams. Around puberty, something changed and I became a voracious reader and decided to become a scientist. My Uncle Mihály protested, seeing no future for such a dull youngster in science.”

As a medical student at the University of Budapest, he started his search to find an approach to science that would lead to an understanding of life. He chose physiology. His studies were interrupted by mandatory military service in World War I. Later, back in Budapest, Szent-Györgyi received his MD.

Early in his career, with World War I over, he studied several branches of science, including

bacteriology and chemistry, while conducting research in Germany. In Holland and England he studied biological oxidation, studies which resulted in an important contribution to biochemistry. In the early 1920s he settled a dispute as to whether oxygen or hydrogen has to be activated for cell respiration. He proved that both elements need to be activated.

His work, carried out in Holland, England, and his native Hungary during the 1920s and 1930s, was initiated by that dispute. His observation of the oxidative blackening process in a cut piece of potato led him to isolate a substance that would later prove to be Vitamin C. After his return to Hungary to accept an appointment as Professor of Medical Chemistry at the newly founded University of Szeged in 1931, he isolated the substance from red pepper (paprika), and coined the name Vitamin C or ascorbic acid (from the word “scorbutic,” “related to scurvy”) because it prevents scurvy.

He received the 1937 “Nobel Prize for Physiology or Medicine” for his discovery of Vitamin C and associated work. This work later served as the basis for Hans Krebs’s discovery of the citric acid cycle of respiration, for which Dr. Krebs received a Nobel Prize in 1953.

In 1937 Szent-Györgyi joined other prominent Hungarians in publicly protesting the first dis-

criminy law enacted against Hungarian Jews. In an article exhibited today in the museum of the Great Synagogue of Budapest (the second largest synagogue in the world), he condemned the persecution of the Jews and criticized the right-wing fascist ideology.

Continuing his search for an understanding of life, Szent-Györgyi wrote in his 1951 book, "... it does not matter which material we choose for our study of life, be it grass or muscle, virus or brain. If we only dig deep enough we always arrive at the center, the basic principles on which life is built and due to which it still goes on." He chose muscle. Even during World War II, he and his team in Hungary made important discoveries in muscle biochemistry, including the isolation of its contractile protein.

His involvement in all these insightful ideas did not isolate him from the world around him. He objected to experiments being conducted on Italian prisoners in World War I. He was outspoken against Hitler, who ordered his arrest, although the war ended before that could occur. He was also outspoken against the Communists during the Soviet occupation of Hungary at the end of WW II and had to escape arrest. He was instrumental in saving others from oppression and possible death during those regimes. Later, as a US citizen, he expressed concern for mankind in the nuclear age.

In early 1943, still in Szeged, he was visited by a number of leading Hungarians who asked for help in freeing Hungary from the Germans. Szent-Györgyi decided to approach the British Secret Service in Istanbul, but first spoke with the Hungarian prime minister, who asked

Szent-Györgyi to convey certain messages to the British. Szent-Györgyi was able to make plans with the head of the British Secret Service that soon had the blessing of London. On his return trip to Budapest he evaded the German agents waiting for him at the Istanbul railroad station: he left by car rather than train!

A German double agent reported Szent-Györgyi's mission. Hitler demanded Szent-Györgyi's arrest. Albert spent the summer of 1944 under house arrest, allowed only to go to his laboratory. Later, Albert decided to leave Szeged and go to Budapest, where Marta, his second wife, who had traveled with him to Istanbul, was in hiding. Marta's sister contacted Albert in Budapest to tell him that his father-in-law had been arrested by the Germans, who had mistaken him for Albert; they soon realized their mistake and released him. The Germans waited in vain at the railroad station in Szeged to arrest Albert, already in hiding in Budapest. For some months, Albert hid in different places there. In 1944 Marta was able to join him in his underground exile, and they turned to the Swedish Legation for refuge. As it was not legal for a non-citizen to reside in the Legation, King Gustavus V, who had presented Szent-Györgyi with his Nobel Prize just a few years earlier, gave Albert and Marta citizenship in the name of Mr. and Mrs. Swensen, good for four years.

In November of 1945 Szent-Györgyi took a newly created position as Professor of Biochemistry at the University of Budapest. Many colleagues from his Szeged lab joined him there to continue muscle research.

Concerned that all of the ground-breaking work carried out by him and his Szeged team had not been published, Szent-Györgyi contacted Hugo Theorell in Sweden for help. When Theorell (who would become a Nobel laureate in 1955) wrote to Dr. Szent-Györgyi (still in hiding) at the Swedish Legation in Budapest, the Germans discovered his location. Trying to evade capture by both the Germans and the Communists, Albert left the Swedish Legation in the trunk of an Embassy car and made it to Switzerland.

Marta, still in Budapest, learned that Stephen Rath, an industrialist friend of Albert who had helped fund his lab, had disappeared. She drove some distance to alert Albert, who, fortunately safe in Switzerland, was able to take action. Believing that the Russians had taken the industrialist, Albert demanded and obtained the release of his friend, who had been severely tortured while in Soviet custody.

In 1947 Albert and Marta Szent-Györgyi decided it was time to go to the United States and moved to England, where they applied for US visas. While they waited, Professor Szent-Györgyi lectured at various British universities. Eventually they were cleared for visas and flew to New York, traveling on their Swedish passports. From there they took a train to Woods Hole.

The decision to go to the Marine Biological Laboratory (MBL) in Woods Hole was prompted by Szent-Györgyi's attendance at the 1929 International Physiological Congress held in Boston, at which the attendees received an invitation from the MBL, as noted in the 1930 Annual Report, to visit the renowned summer teaching and research laboratory. After the conference

several busloads of the physiologists arrived in Woods Hole to explore the laboratory. Other offers of hospitality included an invitation from the Fisheries lab, from the Forbes family to visit Naushon Island for carriage rides and tea, and from James Warbasse to join him at his home at the tip of Penzance Point for a lobster feast. Many of the attendees, including Szent-Györgyi, left from Woods Hole for New York on the Fall River Line ferry.

So in 1947 Szent-Györgyi remembered the MBL and the lobsters and headed for Woods Hole.

With the help of MBL's General Manager Homer Smith, he established his laboratory, the first year-round lab at the Marine Biological Laboratory.

Soon Szent-Györgyi bought a house, Seven Winds, on Penzance Point, and Marta was able to arrange for her two children, Ursula and Gabor, to join them.

A number of Szent-Györgyi's former students from Hungary joined his lab in Woods Hole. These scientists, rarely receiving adequate funding, gradually left Woods Hole as they obtained academic appointments to various institutions. Albert's cousin, Andrew Szent-Györgyi, with his wife, Eve, came in 1949 to join the muscle research ongoing in the lab. They continued at the MBL into the '60s, when Andrew accepted a position at Dartmouth College, and they moved to Hanover, N.H. with their three children, Christopher, Kathy, and David. Later Andrew took a position at Brandeis, where he remained until retiring to Woods Hole.



Marta and Albert Szent-Györgyi celebrating their naturalization, February 2, 1955.

Courtesy MBL Archives.

At the MBL Szent-Györgyi's lab found that the contractile muscle protein myosin, isolated in Hungary, actually includes a second protein that proved to be the activator of ATP, adenosinetriphosphate, which Albert discovered in 1949 as the chemical that causes muscle contractions.

In 1954 Szent-Györgyi was the recipient of the American Heart Association's Albert Lasker

Award for his "distinguished achievement in the field of cardiovascular diseases."

Szent-Györgyi felt, however, that "to understand muscle we have to descend to the electronic level..." As he affirmed in his 1960 book, "we will really approach the understanding of life when all structures and functions, all levels, from the electronic to the supra-molecular, will merge into one single unit." His observations on the importance of submolecular processes underlying various phenomena pioneered the development of submolecular biology.

I joined his lab in 1952, when he was beginning his research into submolecular biology. Szent-Györgyi preferred to have those at the lab call him "Prof." He said, "it takes too long to say Szent-Györgyi." His lab was an exciting and stimulating place. We worked hard and learned to think about the broader picture while observing experimental detail. Laboratory members came together for scientific discussions, at times including leading scientists visiting at Szent-Györgyi's invitation. He encouraged us in these discussions with a favorite maxim:

"Don't be afraid to be wrong!" At other times we gathered for tea in the lab and discussions of general interest, whether scientific, political, or social.

When Ben Kaminer arrived from South Africa in



Albert Szent-Györgyi as Uncle Sam leading the Woods Hole 4th of July parade, ca. 1980.

Courtesy Kaminer family.

1959 to join the lab, accompanied by his wife, Freda, and their children, Brian and Lauren, they were invited by Prof and Marta for a get-acquainted visit. When Prof learned that Freda was an architect, he immediately went to the chalk board and drew a Cape Cod house.

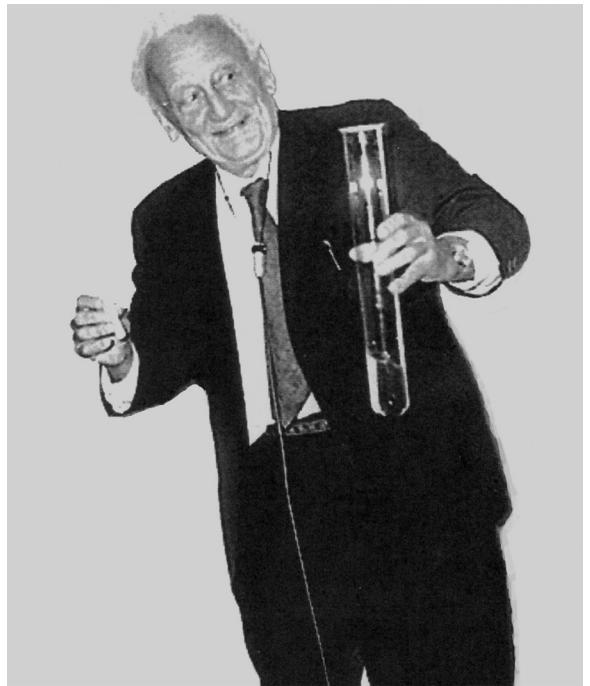
Whenever someone made a scientific discovery, a turkey party was held at Seven Winds. Turkey was chosen because it fed many people. Food, drink, music and dancing made up the program. At other parties, winter or summer, there was usually a theme, and a costume was a must. Everyone had to work a little to contribute to the fun. On one occasion those attending were divided into three competing groups; each was required to present a skit. In one skit, Prof played the part of St. Peter at the Pearly Gates and drew wonderful caricatures of each of us that decided our fate.

Some of the associates in Prof's lab over the years, in addition to Andrew, Eve, and Ben Kaminer, were Irv Isenberg, Spencer Baird, Richard Steele, George Karreman, Eiji Fujimori, Shunichi Hata, Phil Person, Del Philpott, and Rob Beukers.

At Prof's property on Penzance Point there was a beachside cottage—The Pebble—that was made available, at Prof's invitation, for well-known scientists, including George Gamow, Hugo Theorell, and Jim Watson. Ron Pethig and his wife, Angela, and their children, Richard and Helen, also spent a few summers there. Prof's daughter from his first marriage, Nellie Pollitt, and her husband and children, Leslie, Michael, and David, spent many summers there until the late '60s, when Nellie died of cancer. This was

another serious loss for Prof, who had lost Marta to cancer in 1963.

Prof loved living so close to the sea. He was a strong swimmer who gauged the tide through Woods Hole passage such that he could swim with the tide from his home on the Buzzards Bay shore around to the Vineyard Sound side, on the inner curve of Penzance Point, or the reverse, depending on the tide. His friend Gerard Swope once invited him to swim over to his house at the tip of Juniper Point sometime for breakfast. One morning, Prof decided to go. Arriving at the shore of Juniper Point, he climbed over the rocks and went up to the house. Dripping wet, with seaweed clinging to him, he knocked on the door, and announced that he had come for breakfast, but the person who answered was not



Prof lecturing at Boston University on the occasion of his 80th birthday. (1973). Courtesy MBL Archives.

about to let him in. Gerard Swope was away and strangers were using the house. Finally, Prof was allowed to use the telephone to ask his wife to come take him home!

Fishing was another of his pleasures. He had a feel for the subtle conditions required to catch a fish and could tell if he would catch any big fish by the combination of the way the currents were flowing and the degree of light at dusk. He was usually right. Prof said, “I always fish with a big hook—it’s more fun not to catch a big fish than not to catch a little fish.” This was true of his fishing, whether in science or the sea.

When Prof was out of town for one commitment or another, I often received a postcard from him.

Their succinct messages tell something about him.

Boston, February 2, 1955:

“The two youngest USA citizens send their most democratic regards.”

(from Prof and Marta on the day they became citizens)

Chicago:

“Til now all goes well. I had one fight with Teller. In an hour’s time will be another.”

[Edward Teller, the American-Hungarian physicist and father of the H-bomb. Margaret Mead moderated the meeting between these two strong-minded scientists.]



The “Quartet,” ca. 1980. From left to right: Peter Gascoyne, Ron Pethig, Prof, Jane McLaughlin.

Courtesy MBL Archives.



A big fish day.

Courtesy Andrew Szent-Györgyi.

Washington, D.C., October 11, 1964:

“Regards from Washington just before joining Humphrey for a TV appearance.”

[Hubert Humphrey, Minnesota Senator and Vice-President (1964-68) under Lyndon Johnson]

Paris, March 4, 1965:

“Paris is wonderful, people vigorous, and in high spirits—which is infective. So I lectured in French and got through alive without a scandal.”

Indianapolis, October 1958:

“East or West, Woods Hole Best.”

In the 1970s Prof met and married Marcia Houston. Marcia, an artist, and her daughter,

Lola, lovingly shared their lives with Prof at Seven Winds until his death.

In the late 1970s during the Carter administration, a policy change dictated that it was time to return the Crown of St. Stephen to Hungary. After the end of World War II, officials in Hungary had turned the Crown over to the US for safekeeping from the Communists. The thousand-year-old crown of Hungary’s first king was a symbol of authority in Hungary, and had been stored at Fort Knox for over 30 years. Albert Szent-Györgyi was chosen to escort the Crown of St. Stephen home to Hungary in 1978.

Meanwhile, the work continued. Ron Pethig, from the University of North Wales, excited about Prof’s ideas on electronic biology, joined the lab and included a number of his students in the work. Pethig’s student Peter Gascoyne also joined in the effort to understand the role of submolecular biology. Peter reconstructed an electron spin resonance (ESR) instrument that Irv Isenberg had used in earlier years and that we used in our experiments to investigate the behavior of free radicals.

Ron Pethig noted, in *Biokémia* (1987), “Prof had a way of referring to the happy team of himself, Jane McLaughlin, Peter Gascoyne and myself as his ‘quartet.’” In a letter to Pethig in 1985, Szent-Györgyi wrote, “When I settled here in Woods Hole and invited you later I felt that I had started something only I did not know what. Now it is becoming more or less clear what this was: a shifting of the ground on which biology now stands to submolecular reactions.”

Through his pioneering research, Szent-Györgyi turned the long search for an answer to under-

standing the nature of life to free radicals and antioxidants, such as ascorbic acid. This research has spawned much interest in different areas of science, and there is currently much research in laboratories and pharmaceutical companies on the role



Prof at his lab bench, ca.1980.

Courtesy MBL Archives.

of free radicals in a number of diseases and the use of antioxidants as a preventative measure.

The 1988 *Biological Bulletin* quotes Ben Kaminer's tribute at that year's symposium in memory of Albert Szent-Györgyi: "Prof found a haven at the MBL in 1947 and could not have functioned as he did in any other institution. And the MBL would not have been what it is today if not for Prof. He stimulated generations of summer students and investigators and had a profound impact on the Physiology course. His presence at the MBL attracted prominent scientists and his private summer conferences at his home influenced a number of physical chemists and physicists."

For the centennial of his birth, in 1993, the university in Szeged was renamed the Albert Szent-Györgyi Medical University.

Prof worked at his lab bench until shortly before he died in 1986. He is buried in the Woods Hole cemetery on Church Street. His publications

spanned three-quarters of the twentieth century.

I feel fortunate to have had such a long association and friendship with this remarkable human being. Szent-

Györgyi not only broadened the intellectual horizons of all who came in contact with him, but his remarkable range of interests and knowledge and his profound love of life, sense of humor, and generosity of spirit were life-changing gifts to all of us who knew him.

1956: The Hungarian Revolution

Following the Hungarian revolution against Russian occupation in 1956, about 200,000 people left Hungary. Some 30,000 were admitted to the United States. To help teenage Hungarian refugees who had escaped from Hungary without their parents or other relative, Andrew Szent-Györgyi and Albert's wife, Marta, together with Dr. Alfred Senft, and the Rev. Mason Wilson of The Church of the Messiah, organized a committee. About 27 young people were sent to Cape Cod from Camp Kilmer, N.J., fourteen of them coming to Falmouth. They were placed with families to study English, finish high school, and learn about life in the United States. The response from families and schools was remarkable. The young people stayed about three years with their families. One girl returned to Hungary, one boy finished college, another attended the Juilliard School

of Music, many retained contact with their host family; a couple of them remained in Falmouth: one of the boys became a Falmouth policeman and one of girls married a Falmouth fireman. The Refugee Agency considered the whole enterprise a resounding success. Albert Szent-Györgyi arranged for three scientists as well as several family members, both immediate and extended, to come during the next few years. These close family members included Marta's father and sister and Andrew's brother, Gyula, who joined the MBL for a few years before going on to the Illinois Institute of Technology in Chicago; Gyula eventually returned to Woods Hole with his wife, Gwen, and daughter, Lara. One of the scientists came with her sister and her mother, who had survived three German concentration camps. The sister, Edith Ban, went on to establish Café Budapest in Boston.

About the Author

Jane A. McLaughlin earned a B.S. in biology from Trinity College in Vermont. Her entire professional career of 50 years was spent at the Marine Biological Laboratory. On the occasion of Albert Szent-Györgyi's 90th birthday, she received the Albert Szent-Györgyi Award of the National Foundation for Cancer Research "for service to science and mankind." She was an author in the first *Spritsail* issue (1987) and has been an editor since then. She was a writer and editor for the 1986 *Book of Falmouth*, commemorating the town's tricentennial. The author greatly appreciates the information and pictures offered by the families of the late Andrew Szent-Györgyi and the late Benjamin Kaminer as well as the staff of the MBL library.