



Historical Article

Zvi Enrico Jolles Pioneer in Applied Chemistry

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Abstract. When I brought to Florence the death mask of Prof. Angelo Angeli, earlier this year, I was greeted most warmly but with some puzzlement as to how it came to be in my possession.

I discovered that my father, a pupil of Angeli and later a rising figure in Florentine chemistry between 1924 and 1938, had been completely forgotten there after he was expelled from Italy to comply with the fascist Racial Laws of 1938.

This biography aims to fill that gap. It was originally written by his son, Joshua Jolles, on the occasion of the dedication of a Meeting Room at the Casali Institute, Jerusalem in 2005, and has been revised in 2017 by his daughter, Irene Bainbridge, for *Substantia*. It is a story of diligence and adventure, tenacity against many odds, and finally the triumph of optimism over adversity, to be celebrated in Florence, his Alma Mater, with the establishment of the Fondo Jolles, for the preservation of many documents relating to his life and work.

Keywords. Applied chemistry, organic chemistry, scientific biography, racial laws.

1. ACKNOWLEDGEMENTS OF FLORENCE CHEMISTRY MUSEUM

Hugo Schiff (Frankfurt-on-Main 1834 – Florence 1915), discoverer of the *schiff* bases and *schiff* reagent, is considered the founder of the Florentine school of chemistry, having been for fifty years Professor of Chemistry in Florence. The school created by him in 1864 developed further under his successor Angelo Angeli and produced chemists of international calibre, whose faces we can to some extent see in the images preserved in the Section of Chemistry of Museum of Natural History of the University of Florence.

In the past few months one of the hitherto unknown faces has finally regained a name: Zvi Enrico Jolles, assistant to Angelo Angeli and “libero docente” in Applied Chemistry, exiled from teaching in 1938 by the disgraceful implementation of the Racial Laws. Thanks to the generosity of the Jolles family the documents that attest to Zvi Jolles’ activity in Florence have now been brought to Florence. They will form part of the *Fondo Jolles*, an important endowment for the Chemistry section of the Museum: first, because the donation refers to a person who played a significant role in international chemistry; second, because it fills a lacuna in the academic history of Florence; and finally, because it provides new and completely unedited primary

information about Angelo Angeli and his school, in the voice of someone who was very close to him.

So close as to have been entrusted by Angeli with preparing his death mask – a mask Zvi actually took with him in his enforced exile.

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2. INTRODUCTION

Zvi Enrico Jolles was born on 23rd April 1902 in Lvov (Lemberg) in the province of Galicia in the Austro-Hungarian Empire. His life was a remarkable odyssey which reflected much of the history of the 20th Century: from Austria, to British Mandate Palestine, to Italy, to Britain, and then to Israel. He saw incredible technical advances, from the excitement when electric lighting first reached his home, to atomic energy and men on the moon.

He first went to Palestine, travelling on foot or in a donkey-cart, as a young Zionist pioneer to help reclaim the land, where he endured many hardships and survived typhus and malaria; then he returned forty years later by El Al jumbo jet to find the Zionist dream come true - a strong and vibrant modern state of Israel, making great strides in science and technology.

He built up a successful academic career in Italy but had to leave hurriedly as a refugee from Fascist persecution with nothing except the knowledge in his head. In Britain, he was briefly interned on the Isle of Man¹ as an “enemy alien” at the beginning of World War II. He built up his career again in the chemical industry, originating many novel products and processes. He suffered a terrible blow, losing to the Nazi monsters most of his close family who had remained in Europe. He survived the “blitz” in London, life-threatening illnesses, heart attacks, all the time retaining his faith and optimism, his love of family, and devoting himself to the study of chemistry, hoping that one day he would find full scope for his treasury of knowledge and ideas.

On retiring from his post as Head of Research of a chemical company in Britain, he returned to Israel as a scientific advisor to the government and played a leading role in the foundation of the *Casali Institute of Applied Chemistry*. He was appointed to a newly created Chair in

Applied Chemistry in the Hebrew University and was the first Director of the Institute. Sadly, when he was at last beginning to see his ideas for it coming to fruition, he left this life on 13th June 1971, aged 69 years.

3. LEAVING POLAND FOR THE PROMISED LAND

Bernard Jolles, the father of Zvi, had been a modestly prosperous timber merchant producing pit-props for coal-mines and railway-sleepers for the Polish government. His father’s father had been at one time an innkeeper and then a printer. On the whole, they were scholarly people; in the male line there were distinguished scholars and rabbis, some of whom combined enlightenment and secular learning with their study of Torah and Talmud. On the side of his mother (Malka Leiter) was a numerous extended family throughout the province of Galicia who played an active role in community social and charitable activities.

They were traditionally observant, as were most Jews in those parts. They kept the Shabbat so strictly that writing or cutting paper with scissors was forbidden. It was a household of order, discipline and study. At the age of four Zvi was sent to the “cheder” where he learned to read and write Hebrew and study the Torah. By his diligence and concentration he avoided the slapping and ear-pulling which were the regular teaching aids in those classes.

Later he went to a state school, the Gymnasium, where he first encountered anti-semitism. The worst perpetrators were some of the teachers. Three to four centuries earlier the Jews, who had been expelled from Spain and were migrating eastwards across Europe, had been accepted by the Polish kings as they helped to bring development and prosperity to their host country. The family name of Jolles is believed to have originated in Spain but from the 16th century onwards appears to have spread to Holland, Austria, Poland, Russia and even England. Over the course of the 19th Century, the historic territories of the Polish kings had been carved up between Austria, Russia and Prussia. The glory days of Poland had long gone, but there were lingering folk memories of a once great kingdom and noble traditions.

From the moment when an idyllic family holiday in a Carpathian mountain village was cut short by the outbreak of the first World War in August 1914, the region was plunged into turmoil. First the Austrians fought the Russians; then, as the Austrian Empire crumbled and Russia was convulsed by the agonies of the Revolution, the conflicting imperial armies melted away. Polish nationalism revived and by 1917-18 machine-gun fire

raked the streets of Lvov as Poles fought Ukrainians for control. None of this was good for the Jewish community, who had enjoyed peace and stability under Austrian rule. For three centuries they had prospered but now they were exposed in quick succession to the endemic anti-semitism of Russians, Cossacks, Ukrainians and Poles who terrorised this once peaceful old town, often venting their frustrations on its Jewish inhabitants.

In his early teens Zvi Jolles had reached the conclusion that Poland could no longer be his country and that as long as the Jewish people did not have their own land they would wander the world for ever, never quite belonging anywhere. The Zionist dream – a homeland for the Jewish people in the land of Israel – gave him hope and inspiration. Zionism was an intellectual ferment among young Jews. Zvi joined the Hashomer Hatzair (“the young guard”) and listened eagerly to outstanding speakers such as Hirsch Lauterpacht (much later Professor of International Law at Cambridge University, who memorably expressed the concepts of “Human Rights” and “Crimes against Humanity” at the Nuremberg Trials). Many young people in those days idealised Socialism but Zvi focused his thoughts on returning to the ancestral land of Israel. At the age of sixteen he left school and went to train on a farm, to prepare himself for the hard physical labour that lay ahead.

In 1917 the Balfour Declaration² gave a completely new impetus to Zionism and at the age of seventeen Zvi Jolles set off on foot through the chaos and anarchy of central Europe in the aftermath of the Great War, to make his way to Palestine. It was a hazardous adventure. With the help of friends and supporters of the Zionist movement, he crossed the Balkans, often hidden in peasants’ hay-carts, sometimes given shelter by Jewish families, until he reached Turkey. Here, he was promptly arrested and imprisoned for having no passport. He was rescued by the British Consul, who provided him with an identity card as a Palestinian resident under the British Mandate. He completed his journey by ship to Jaffa and was sent by Hashomer Hatzair to Degania, a kibbutz in the north. At first, he spoke entirely in the language of the Bible, but soon became fluent in modern Hebrew.

From 1919 to 1924 he worked as a Halutz (“pioneer”), harvesting oranges and lemons, draining marshes, ploughing stony hillsides, planting trees, building roads by hand. The pioneers lived in tents by the roadside. In the evenings they sang Hebrew songs round the camp-fire; then guarded the settlements at night. On the road they were building from Haifa to Nazareth he met David Horowitz, afterwards Governor of the Bank of Israel, who much later was able to give first-hand testimony of their experiences to a UN fact-finding mission.

Unknowingly Zvi was one of the very first of the Third Aliyah (“going up”) that followed WW1 and the Balfour Declaration: a select group of inspired young people who were prepared to endure all kinds of hardships and privations in pursuit of their pure Zionist ideals. Some of them were to become leading political and public figures in the development of the Jewish state, others distinguished academics in Europe and the USA. A reunion of these Halutzim in London in the 1950s revealed their later achievements in many walks of life.

Zvi returned to Poland briefly in 1922 to take his matriculation examinations for entry to University. All along this had been his intention while working on the land – a textbook always with him in the roadside tent. The occasion to go to University came sooner than he expected or desired, as a result of contracting typhus and malaria that he was fortunate to survive. Polish universities operated a *numerus clausus* for Jewish applicants, so he left for Italy in 1924.

4. IDYLIC ITALIAN YEARS

The Duce, Benito Mussolini, had thrown open Italian universities to foreign students, free of fees. It was a grandiose gesture which succeeded in attracting many young intellectuals to Italy. Many were Jews who were glad to leave the anti-semitism of Poland and Eastern Europe for study and work in a friendly and relatively free country. Zvi made his way to Florence where he signed up to study Engineering but switched to Chemistry after a few months because to him it was far more exciting, reaching towards an understanding of the secrets of



Figure 1. Zvi Enrico Jolles (left) with a colleague in a laboratory of the Institutes of Chemistry of the University of Florence (from the private collection of the Jolles-Bainbridge family, now in the Fondo Jolles at Florence University Museum of Natural History).

life. At the same time, he enrolled his younger brother Benjamin to read Medicine and sent him a telegram to come quickly from Lvov. It was for a long time a matter of regret to him that he had not chosen Medicine for himself; but he had been motivated by the length of the courses and the necessity to start earning a living as soon as possible. His father was finding it difficult to continue sending his sons an allowance for their keep in Italy because the newly formed Polish government was unfavourable to Jewish businesses, many of which were in serious decline.

Zvi's brother, Benjamin, had also found difficulty in getting admission to a Polish university because of the restrictive quota. After completing his medical studies in Florence he went on to become an outstanding pioneer of new methods in radiotherapy and palliative care. He was the only one of the immediate family whom Zvi managed to extricate from Poland before the havoc of the Holocaust destroyed the rest of the family along with the whole Jewish community which had flourished in Lvov. The streets and houses are still recognisable today, but there is no trace of the lively communities which once existed. Indeed the Yad Vashem memorial in Jerusalem is grim testimony to the genocide which decimated the Jews of Europe.

Meanwhile, Zvi showed such promise that he was greatly favoured by Professor Angelo Angeli (an

internationally renowned chemist referred to by his pupils as the "Maestro"), who appointed him as his assistant. When Zvi had disembarked in Naples he spoke in his best high-school Latin. Now he

rapidly became fluent in Italian, later delivering lectures and writing many scientific papers in that language. He was an outstanding chemist and soon made his mark. In collaboration with the Maestro, he became expert in the chemistry of nitro-, nitroso- and azoxy-compounds. He took his Doctorate "Summa cum laude" and was soon guiding and teaching colleagues who had started their studies at the same time.

In 1930 he was awarded the prestigious "Ugo Schiff Prize" in Chemistry³.

Though dogged by the lack of Italian nationality, Zvi threw himself energetically into appointments such as "assistente volontario" and "supplente" in the department of Chemistry. During Angeli's last illness he took on the burden of most of the teaching duties of the Maestro and supervised many doctoral students' theses⁴ and dissertations. Indeed, among them are some now illustrious names such as Giovanni Speroni. Angeli wrote letters⁵ to support Zvi's application for citizenship but he died in 1931 and did not live to see it granted later that year.



Figure 2. Zvi with the "Maestro" Angelo Angeli in Pracchia (Pistoia, Italy); (from the private collection of the Jolles-Bainbridge family, now in the Fondo Jolles at Florence University Museum of Natural History).

In 1937 he created a special course in Applied Chemistry which was attended by a wide range of people beside the undergraduates and doctoral students: industrial and government chemists, military officers and business executives. This new course soon gained official recognition by the University: Professor Passerini, then head of the faculty, wrote commending it⁷ and in 1937 Zvi was confirmed Associate Professor of Applied Chemistry⁷.

It was in Florence that he met his wife, Nidda Cocceani, who was doing a doctorate in Italian Literature of



Figure 3. Zvi (in the centre) with collaborators at Pontelagoscuro, just before the departure from Italy; (from the private collection of the Jolles-Bainbridge family, now in the Fondo Jolles at Florence University Museum of Natural History).

the “Romance period”. She had trained as a schoolteacher in Gorizia and was taking advantage of the offer of free university tuition extended to residents of Venezia Giulia. It was to be seven years before they were able to marry, only when they had achieved financial security: that was how people conducted their lives in those times. They had two children, Giosuè (Joshua) and Irene, and enjoyed a happy family life, often entertaining colleagues and students at their home. During those years, lasting friendships were forged, as is clear from the correspondence with colleagues both inside and outside Italy and now preserved in the *Fondo Jolles* of the “Ugo Schiff” Department of Chemistry of Florence University.

5. ESCAPE TO ENGLAND AND A NEW LIFE

Alas, It was too good to last: Mussolini on his ill-fated visit to Nazi Germany, signed an accord which cre-



Figure 4. Giosuè and Irene in Italy (1938); (from the private collection of the Jolles-Bainbridge family, now in the Fondo Jolles at Florence University Museum of Natural History).

ated the Fascist “Axis”; and in 1938 the Italian Fascist government began to apply its own punitive racial laws⁸ in Italy, a country which had traditionally been tolerant of minorities. On 13th October 1938 Zvi received a letter from the Rector of the University⁹ informing him that he was dismissed from his teaching posts and any other official appointments “on account of Hebrew race”. He had also had his Italian citizenship revoked by the September 1938 legislature.

He did not tarry. On 24th October 1938 he arrived in Folkestone, England, carrying a precious invitation from his sponsor, Professor Robert Robison (of the “Robison ester” in sugar metabolism). They had met briefly at the 10th International Congress of Pure and Applied Chemistry in Rome in 1936, where Zvi Jolles had presented a paper.

His entry to England on an Italian passport was problematic, being on condition that he would be returning to Italy within one month. He worked initially at the Lister Institute for Preventive Medicine in London, where he applied his knowledge of sugar chemistry to carry out research into the protective coat which surrounds certain bacteria. Unfortunately this was temporary, unpaid work and there was an urgent need for a salary to support his wife and family as his meagre savings were rapidly dwindling.

When he arrived in England he spoke the English of Dickens, having read “David Copperfield” in his Polish high school. Now for a third time, he became fluent in



Figure 5. Zvi Enrico Jolles in the passport photo of 1938; (from the private collection of the Jolles-Bainbridge family, now in the Fondo Jolles at Florence University Museum of Natural History).

a new language, writing scientific texts and innumerable letters of application for financial support and permanent work, using his beloved Olivetti typewriter, one of the few possessions he brought from Italy.

Amid the mounting tensions of the 1930s, British men and women of goodwill could see that there was no time to lose. A group of mainly Oxford, Cambridge and London academics, under the leadership of Lord Beveridge, had earlier established the Academic Assistance Council, which then became the Society for the Protection of Science and Learning (SPSL). Its express purpose was to extricate threatened academics mainly Jewish - from the Nazi and Fascist menace in continental Europe. The aim was to help them rebuild their careers.

A key figure in the work of the SPSL was Esther Simpson¹⁰, assistant secretary at the time, who helped scores of refugee academics and their families, whom she came to know personally. The natural empathy she brought to the task was a lifeline through what were very difficult times. For my parents it was a hand-to-mouth existence as the loans from the Society were necessarily small. But they kept us going through those dark years. Much of the correspondence with my parents from that period is preserved in the archives of the SPSL in the Bodleian Library in Oxford¹¹. It was with immense gratitude that Zvi accepted ongoing help and moral sup-

port from them. It is recorded that he later repaid every penny he received, but the support went far beyond the material help available.

Although in Britain there was an initial reluctance to adopt the newcomers and give them full scope for their professional talents, it is true to say that the virulent anti-semitic policies in Nazi Germany and most of eastern Europe created a veritable “brain drain”, benefiting Britain and indeed the US, who thereby gained a long-lasting lead over the rest of the world in Science, Technology and Medicine.

In the summer of 1940 Zvi was delighted to be offered a place with the Imperial Chemical Industries in their Research Department in Blackley, Manchester, but this was short-lived. Only two weeks later, on 10th June 1940, Italy entered the war, invading France in support of their Nazi allies (to the great reluctance of most Italians who saw Germany as a traditional enemy of Italy and Austria a hated occupying power in important areas of northern Italy). Two policemen came to the ICI Library to arrest Zvi.

Ironically, on arrival in England, Zvi was regarded as an Italian citizen and therefore now became an “enemy alien”. Following Churchill’s famous instruction to “collar the lot”, Zvi was swept up with Germans and Austrians, Nazis, Fascists and anti-Fascists, socialists, refugees from Fascism, restaurant owners, waiters and chefs, ice-cream merchants, businessmen, students, sailors from merchant ships caught in British ports, opera singers and instrumental musicians, Roman Catholic priests and monks, and a sizeable contingent of Jewish academics and students; all interned together on the Isle of Man¹ in what had been, in times of peace, a popular holiday resort. The only common factor to this assorted bunch was their origin from countries now at war. Through the thorough, impersonal, even-handed workings of British bureaucracy they were housed by nationality in the hotels and boarding-houses of the island, surrounded by barbed-wire fences and guarded by the Army.

It was in this incongruous setting that he met an Italian Jewish businessman and engineer, Alberto Casali, who had been sent to Britain by the Stock distillery company of Trieste, owned by his family, to study British distilleries. He, too, found himself interned as an “enemy alien”. Thus began a life-long friendship which, many years later, had far-reaching consequences.

It was not long before there was a veritable university in session! Zvi Jolles very soon began to teach Chemistry to many of the students whose university courses had been interrupted. Zvi was fond of relating how quickly everyone fell into their accustomed professional and occupational habits and attitudes. The chefs

cooked, the businessmen organised rotas, the musicians rehearsed and presented recitals and the academics taught the students and discussed the latest theories. Zvi's internment only lasted six weeks – it was not long before the intervention of ICI, in those days a real power in the land, secured his prompt return to their Research Department. When they heard he was leaving, his fellow-internees, fascists, students, priests, sea captains, saved their meagre rations, from which some of London's finest chefs cooked up a banquet in his honour, attended by representatives of all the diverse groups.

He was lucky not to have been selected for transportation to the colonies. The ill-fated "Arandora

Star", bound for Canada, with twelve hundred on board, was torpedoed by a German submarine in the Irish Sea. Hundreds went down with the ship. There were only five hundred and thirty survivors, many of whom were then loaded onto the "Donera" bound for Australia!

Back in the ICI Research Department, Zvi Jolles immersed himself in searching for novel chemical

compounds which could have useful applications in medicine or technology. From his experience in sugar chemistry, he envisaged the many hydroxyl groups of cellulose and other polysaccharides as rows of hooks to which appropriately reactive molecules could be attached, perhaps as carriers or linking agents for other molecules with desirable properties. Arising from this work it occurred to him that it should be quite feasible to attach dyestuffs chemically to cotton fibres, giving them exceptional resistance to wash and wear. Dyeing of cotton had hitherto depended not very successfully on physical properties such as hydrogen bonding, van der Waals forces, molecular configuration, or on precipitation of the dye within the fibre for instance as metal salts. True chemical bonding was a kind of Holy Grail; it had been investigated but was not seen as a practical proposition for industrial application. Zvi Jolles brought fresh thinking to it, with his expertise in other areas of chemistry.

6. DIFFICULT TIMES - NEW DEVELOPMENTS

The Research Department in Hexagon House lay in a deep valley by a tributary of the River Irwell, just outside Manchester. The village of Blackley had been overwhelmed by the Industrial Revolution; its rows of terraced houses were occupied by the workers who toiled in its sprawling industries. The main road spiralled down into the valley, which was almost permanently shrouded in a pall of acidic yellowish fog with tints

depending on the prevailing production process taking place in ICI's plant.

On a cliff high above the valley stood the "Woodlands Club", a substantial Victorian pile which served as ICI's clubhouse, where the senior staff of the Research Department held their monthly meeting with their eminent external consultant, Professor (later Sir) Robert Robinson (later to become President of the Royal Society). Prof. Robinson was sceptical of the notion of dye-stuff-fibre combination until Zvi brought to the meeting some extremely wash-fast brilliant orange cotton squares where the colour proved to be in true combination with the fibre. The work was not taken further at this time unfortunately, perhaps because Zvi Jolles now began to suffer serious ill health; but the soundness of the basic idea was vindicated in ICI's later development of a whole range of Procion dyes.

During this time Zvi had received news that his father and two brothers in Lvov had been murdered by the Germans - their hiding-place believed to have been betrayed by a Polish janitor, later hanged as a Nazi collaborator. Externally, Zvi bore the dreadful news stoically, but it must have affected him deeply. As a result of a laboratory accident, he suffered a serious burn to his left hand; from then on he was dogged by illness year after year, no doubt aggravated by the grief within him. He spent many months in hospitals. Supported by his wife and with tremendous fortitude he emerged from this dark period as resolute as ever and went on to write important contributions to major chemical reference books - "Quinones" in Thorpe's Dictionary of Applied Chemistry¹² and chapters on azo-, azoxy- and nitroso-aromatic compounds, diazo-resins, hydroxylamines and others in "The Chemistry of Carbon Compounds"¹³ (Elsevier).

In 1954 Zvi was intrigued to read an advertisement by a small chemical company in London seeking to recruit a head of research and apparently having links with Israel - and he was eager to return, this time hoping to contribute to the development of a chemical industry there. In the dark days of 1941 he had already met Dr. Chaim Weizman (himself a chemist and later to become the first President of the State of Israel) in London to discuss this possibility, but had never been able to follow it through then because of health problems. Within three months in this small company, Zvi had developed a novel process for one of their main products. Now came a curious twist: F.W.Berk & Co Ltd., established in 1871 by a family of German immigrants, bought out the smaller company. Berk manufactured a range of bromine compounds and had active links with Israel, specifically with the Dead Sea Works. Zvi, now

Head of Research of the whole company, once again took up the challenge of a new direction.

Since the 1920's bromine had occupied a "niche" market, being used in the manufacture of lead "anti-knock" additive to motor fuel. About 90% of the world bromine consumption at one time was, in fact, just for this use. But by the 1960's public awareness of health and environmental issues was beginning to make a serious impact on the use, in all kinds of applications, of chemicals which contaminate the environment with toxic residues. This was bad news for bromine producers such as Israel which had, in the Dead Sea Works, one of the world's richest sources of bromine. Though there were major outlets for bromine in agriculture and photography, the outlook was not encouraging. Not to be defeated, in 1959, Zvi unveiled a comprehensive programme of work on fire-retardants for a variety of materials based on bromine, (particularly for use on passenger aircraft) a significant innovation in this field. With this project, he had found a circuitous route back to Israel!

He saw that the chemical literature, which had an abundance of information on chlorine and its compounds, was severely lacking it on the analogous bromine compounds as well as on the element itself. He set about compiling a monograph on the neglected halogen. With the assistance of an excellent personal secretary Mrs. Elsie Barrett, wife of a chemist and herself an accomplished landscape painter - he planned and collected material for his book. Then once again, circumstances turned against him and he was struck down by a heart attack in 1963. With his characteristic faith and optimism, he carried on. The book "Bromine and its Compounds"¹⁴ (Ernest Benn, 1966) was widely acclaimed and became a standard reference work.

7. THE REALIZATION OF A DREAM

In 1963 Berk had asked Zvi Jolles to go to Poland to represent them at the Poznan Trade Fair. It was a bitter-sweet experience for him, his first visit to Poland since he had left in 1922 and all the tragic events that followed. He still spoke Polish fluently and was well-received. Then in 1964 he was asked to visit Israel on behalf of the company. How he must have enjoyed that! It had taken him precisely forty years to return to the land he had dreamed about as a boy and worked in as a young man.

When in 1966 he retired from his post as Head of Research at Berk he was invited to Israel as consultant to the National Council for Research and Development (Prime Minister's Office) with special reference to



Figure 6. Zvi (left) with Alberto Casali; (from the private collection of the Jolles-Bainbridge family, now in the Fondo Jolles at Florence University Museum of Natural History).

the utilisation of Israel's raw materials. It was then that he thought of creating a Bromine Institute, taking as a model such establishments as the Tin Research Institute in Holland.

Each year in October, Zvi and Nidda travelled to Israel, returning via Italy in April or May, spending a few weeks in Gorizia, Trieste or Venice, and reaching home in England in June, a very pleasant itinerary, which was some compensation for all the hard years. In recognition of the impetus that Zvi Jolles could give to applied chemistry in Israel, he had been invited to the Hebrew University in Jerusalem as a Visiting Professor.

When he travelled in 1966, he took with him copies of the Bromine book, fresh off the press. Taking a train to Trieste, he went to visit his old friend Alberto Casali at his villa in Opicina, in the hills above the town. Alberto was now the head of the Stock distillery company, with factories in Italy, Austria, South America and Israel. He had been for some years the Honorary British Consul in Trieste and had been decorated by the Italian Government for services to industry and exports. Zvi and Alberto talked about Israel's need to develop a lead in technology. The two men found much common ground and Alberto Casali decided to back the vision of an institute of Applied Chemistry.

There followed a year and a half of negotiations with the Weizman Institute in Rehovoth that ultimately stalled; then one day Zvi had lunch with Avraham Harman, formerly Israel's Ambassador to Washington and at this time President of the Hebrew University. Within a week the whole scheme fell into place - the creation of the Casali Institute of Applied Chemistry¹⁵ on the Givat Ram campus was agreed.

By 1969 the Casali Foundation had been established and the Alberto and Kathleen Casali Fellowship Foundation was supporting a number of post-doctoral stu-

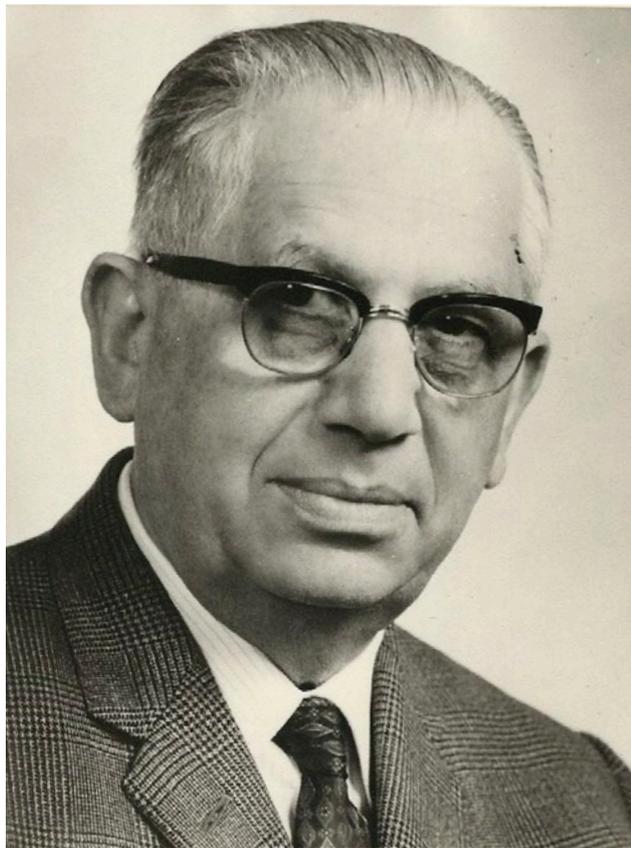


Figure 7. Zvi in Jerusalem, 1970; (from the private collection of the Jolles-Bainbridge family, now in the Fondo Jolles at Florence University Museum of Natural History).

dents at the Hebrew University with grants and scholarships. By 1971 the foundation stone had been laid. The work of the Institute was meanwhile taking place in borrowed premises, by kind permission of Professor Shaul Patai. Zvi Jolles had been appointed Professor of Applied Chemistry in the Hebrew University and the first Director of the Institute, a fitting culmination to his career. While always maintaining the highest scientific standards of pure research, he was eager to find practical ways in which his work could benefit the wider community.

Unfortunately Zvi Jolles was now seriously ill, needing an operation, and as he felt he might not be able to see the building of the Institute to its completion, he asked Professor Gabriel Stein to take care of it until his return. Not long after the operation he left this life on 13th June 1971 and was buried on the Mount of Repose (Har Hamenuhot) on the west side, looking towards Tel Aviv, in the section for Professors of the Hebrew University.

8. CONCLUSIONS

It has been our privilege to write about our father, Zvi Jolles. A man of exceptional qualities and culture, he spoke seven languages and understood at least nine. His warm personality and entertaining company, combined with a compassionate and courteous nature, endeared him to all who knew him. Now almost half a century later, we can see how his aim to benefit society by research and development is being successfully achieved in his brainchild of Applied Chemistry in Jerusalem, using modern technology in fields as diverse as biodegradable polymers, biomedical composites, security, forensics, environmental science, energy, water conservation, pharmaceuticals, and geochemistry.

9. ACKNOWLEDGEMENTS

We are extremely grateful that Florence University, his old Alma Mater, from which he was so cruelly exiled, should now see fit to house an archive in his name in the “Ugo Schiff” Department of Chemistry, where the first flowering of his life’s work began.

We would like to express our sincere thanks to Prof Goti, Head of the Department of Organic Chemistry, to Prof Antonio Guarna and Dr Laura Colli for their invaluable help and encouragement throughout the project, and to Dr. Anna Teicher for her expert historical advice.

I would like to express particular appreciation to Dr. Laura Colli for her dedication and professionalism. She has driven the project forward with determination, gentle firmness and sheer hard work that is now reaping rewards with the establishment and progress of the Chemical Heritage Project at Florence University. We are very fortunate that it is in such capable hands for the time being at least. It is to be hoped that the support and recognition her work deserves will be ongoing.

I owe her my personal thanks for guiding me through the stages of setting up the *Fondo Jolles* in memory of my Father, with the vision and sensitivity she has brought to the task.

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Full Curriculum Vitae of Z.E. Jolles up to October 1969 is held by Fondo Jolles of "Ugo Schiff" Chemistry Department Florence University.