

authorized, slightly revised version of the article published in
ALMAGEST vol V, issue 2 (Nov 2014), pp. 26-39

Cosmopolitan Oscar Buneman (1913-1993): his serpentine path from Milan to Stanford

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Dedicated to
Prof. Dr. Dr.h.c.mult. Roland Bulirsch
on the occasion of his 80th anniversary

Abstract

Oscar Bünemann (* 1913 in Milan, Italy, + 1993 near Stanford, USA) was born to a cosmopolitan mercantile family of Hamburg, Germany. He crossed many borders of states: forced by political circumstances first (WWI, the Nazis, WWII), and by his own decisions later on. Change to British citizenship in 1944 and change of name some years later.

He also crossed borders between scientific disciplines: he started as a student of (pure) mathematics and physics in Hamburg and took exams in (applied) mathematics and theoretical physics in Manchester. For several years he worked as a university lecturer for mathematics at Cambridge University and became a Professor of Electrical Engineering at Stanford University later on, heading an Institute for Plasma Research there. He taught at summer schools and spent sabbaticals in various countries.

Stanford students thought that he was British by birth, but in his private life he was a Californian *outdoors person*. He considered mathematical elegance a very important issue. He and his wife Ruth were very concerned about environmental issues.

1 Culture shocks and Cosmopolitans

When US citizens move over large distances for the first time, say from New York to Los Angeles, they talk about 'having a culture shock'. Most people are prepared to experience some kind of difficulties when moving to an unknown place. In case they move back to the

first place after a while, however, there *may* be a second culture shock, the re-entry shock. This usually hits as a surprise.

In (Wikipedia 2012) we read: `... *Culture shock has many different effects, time spans, and degrees of severity. ... Many people are handicapped by its presence and do not recognize what is bothering them.*' – '*... Some people manage to adapt to the aspects of the host culture they see as positive while keeping some of their own and creating their unique blend. They have no major problems returning home or relocating elsewhere. This group can be thought to be somewhat cosmopolitan ...*'.

In this text, we will adopt this meaning of '*cosmopolitan*'.

2 Cosmopolitan mercantile Bünemann family

The grandparents of Oscar Buneman, E.W. Hermann Bünemann (*1850 in Bremen, Germany) and Elisabeth F. Michaelsen (*1852 in Hamburg, Germany), first met in Havana, Cuba. He traded there with cigars since 1870, and she was a teacher. In 1879 they got married in the German consulate in Havana. Their first child Anna was born in Dec 1880 in Havana. When Elisabeth heard that her father-in-law was disappointed that she was descended *only* from a family of teachers, she decided to travel to Hamburg to meet her new parents-in-law. They were delighted when they met her and their grandchild Anna and they invited her to stay with them for a while. It is not recorded how long she stayed in Hamburg. But it is reported that mother and baby traveled back to Cuba in Nov-Dec 1881. On this return journey, their ship was hit between Southampton and Hoboken by a heavy storm, was severely damaged and nearly sank. The Bünemanns returned from Cuba to Hamburg in 1884, together with two own children and three nieces/nephews. In Hamburg, they had five more children.

Hermann learned four languages: Latin, French, English and Spanish. How many languages his wife Elisabeth spoke is not reported. We may assume that she spoke at least English and Spanish, and probably also Norwegian. One of her brothers was born in 1857 in Christiania, now Oslo, so she probably spent (part of) her childhood there. Another brother, born in 1844 in Hamburg, lived on Cuba. Through him she met her future husband. That brother and his Creole wife Elvira Galetti had three children. Because Elvira died, Elisabeth took care of them, and the Bünemanns took these children with them to Hamburg. (Waldesnacht 2010)

Oscar Buneman's father August Oscar (* June 1885 in Hamburg, + June 1958 in Hamburg) was their 4th child. After school he had an apprenticeship in France. He married Elisabeth Hüffmeier (* Dec 1889 in Hamburg; + Jan 1957 in Hamburg) in Jan 1910. The Hüffmeiers used to be seamen and artisans and were very humorous. Oscar's grandfather Emil Hüffmeier was a civil servant (Verwaltungsbeamter), a member of the Hamburg parliament (Bürgerschaftsabgeordneter), and enthusiastic about the sciences. (Zentrum 2010; Bünemann AWH 2002; Waldesnacht 2010; Bünemann G 2010; Buneman M 2010)

After their wedding August Oscar and Elisabeth moved to Milan, where August Oscar had a drapery trade, together with an Italian partner (Bünemann & Bartolucci). Besides German, August Oscar and Elisabeth both spoke at least Italian, English and Esperanto. Both liked to read George Bernard Shaw in English (Bünemann G 2010; Flowers 2009) and both were active in the Esperanto community (Pabst 2012).

Esperanto was designed as 'International Language' by Dr. med. Ludwik Lejzer Zamenhof in 1887. Zamenhof grew up in a multi-cultural, multi-language neighborhood in the Russian-ruled part of Poland and wanted to provide a simplified, easy-to-learn language which is independent of states and cultures. An Esperanto movement quickly spread into many countries, in Europe and elsewhere. Many people, also workers, learned Esperanto and started international friendships by exchanging letters with persons in other countries. Very soon, however, this development was counteracted by dictatorial and nationalistic governments like those of czarist Russia, Stalin, Hitler and others. (Wikipedia 2013)

Oscar's father August Oscar spoke 13 languages (Bünemann G 2010), in addition to Italian, English and Esperanto also Polish, Russian, the Scandinavian languages, Finnish, French, Spanish (Bünemann AWH 2002) and probably Romanian. He published his own poems in Esperanto and translations of poems from Italian and Norwegian. He also translated Henrik Ibsen's *Ghosts* into Esperanto. (Kromann 2012, Ibsen [1881] 1910, 1925). He co-organized the *Deutsche Esperanto-Kongress* in Hamburg in 1931 (Esperanto 2012). In 1936 his Esperanto activities were explicitly forbidden by the Gestapo 'to protect the people and the state' (Buneman Papers 2011, letter of Sept. 22, 1936). After the Nazi era, he resumed his Esperanto activities. He had many Esperanto friends in other countries with whom he exchanged letters (Bünemann G 2010).

3 Oscar Buneman (1913 - 1945)

Oskar Bünemann (OB) was born in Milan in Sept 1913. Because of the first world war, the family had to leave Italy in 1915 very abruptly. Until the end of the war, mother Elisabeth and their children Elisabeth (1911-1916) and Oskar stayed with her parents in Hamburg, and father August Oscar served as an interpreter and/or translator in Romania. (Bünemann G 2010; Waldesnacht 2010)

The parents organized their lives to be advantageous for their children Oskar and Gertrud (*1920) (Bünemann G 2010): During the first years the family home had a garden and was close to meadows and fields. A few years later the family moved to a relatively wealthy neighborhood in the city, so that the children could easily attend good schools. Oskar attended the famous *Gelehrtenschule des Johanneums* (founded in 1529 by a friend of Martin Luther) from 1924 until 1932. Oskar learned English, French, Latin and Greek. He finished this school in February 1932 with the German Matriculation Examination. In the final certificate (Reifezeugnis) his teachers praised especially his performance in mathematics, physics, English and German literature (Buneman Papers 2011, Zeugnis der Reife).

In April 1932 he started to study mathematics and physics at University of Hamburg with the goal 'Ph.D. exam and Teacher's exam' (Zentrum 2010). One of his professors was *Emil Artin* (1898 - 1962). Oskar attended Artin's working group (Arbeitsgemeinschaft) for algebra already in his third semester (Buneman Papers 2011, Studienbuch). They played also music together, and when they saw each other in a hallway of the university, they greeted each other by whistling a melody (Bünemann G 2010).

The Nazis came into power end of January 1933. Though they could not be as active and aggressive in the internationally open Hanseatic city as they were in Munich, the consequences were felt immediately. End of March, beginning of April 1933 there was massive political pressure in Hamburg for non-Jewish employers to dismiss their Jewish employees (Bajohr 1997). A few months earlier non-Jewish father Bünemann lost his position in a company of Jewish employers. Family Bünemann was without income for a while. In Sept 1933 they moved from their comfortable home into a more modest dwelling. (Bünemann G 2010; Buneman Papers 2011; Buneman M 2013)

Oskar belonged to a group of friends who designed and distributed anti-Nazi texts. They were discovered in April 1934 and imprisoned in the concentration camp part of Prison Fuhlsbüttel. Together with a lawyer, Oskar's father August Oscar succeeded in getting them moved to the regular remand part of Prison Fuhlsbüttel after a few days (Bünemann G 2013). Sitting alone in his remand cell, Oskar spent his time solving mathematical problems, keeping intermediate results in his mind overnight. The group then had a 'regular' trial, based on a 1934-law that was declared null and void in the fall of 1945. Oskar was sentenced to 18 months. As soon as it was clear that he would be released in September 1935 and that he would be allowed to leave Germany, Oskar's father arranged by mail (with help of Prof. Artin) that Oskar could enter the Honours School of Mathematics at University of Manchester, *second year* in October 1935. Letters from England that he is accepted as a student arrived end of September. He began to study in Manchester in October 1935. Soon he was the '*best man of the year*'. (Bünemann G 2010; Buneman M 2013; Buneman Papers 2011, several documents)

In June 1937 OB was awarded a first class in the final examination of the Honours School of Mathematics. In July 1937 he got a B.Sc. degree and a 'Derby Mathematical Scholarship' (July 8; amount L 30 per annum, tenable for one year(s)) and a 'supplementary grant to Derby scholarship' (July 22nd; amount L 40 per annum, tenable for one year(s)). In 1938 OB got his M.Sc. degree and a 'Beyer Fellowship' (July 8; L 100 per annum, for one year(s)). He started to work for his PhD. (Buneman Papers 2011, several documents)

On 1 Sept 1939 the second world war broke out. As a German (i.e. alien) citizen, OB was interned by the British from April 1940 to March 1941, first on Isle of Man, then in Canada. This was hard for him, though conditions were probably more favourable than in the Hamburg prisons. Several German speaking future colleagues were interned with him, for instance Thomas Gold (1920 - 2004) and Hermann Bondi (1919 - 2005) from Vienna. Gold later recounted: *'He was a marvelous companion in those trying times. He was one of the very few non-Jewish refugees from Nazi oppression in the camp. Evidently he had strong principles and saw the Nazi hell that was being created. He and (Sir Herman) Bondi were the prime movers in the camp university and I certainly learned a lot more from them than I would have had I remained in Cambridge for those nine months'* (Buneman et al 1994). Because OB was not Jewish, the British suspected him even more of being a German spy than his companions. To improve his situation, he *'... applied successfully to be admitted to an enclosure reserved for orthodox Jews, and the fact that he obviously wasn't a member of that fraternity escaped the notice of the camp officers.'* (Flowers 2009). His second wife Ruth later told: *'He taught me a lot about the stars. Moving from Germany to England to Canada as a young man, he felt it was wonderful that the stars were constant.'* (Stanford News 1993).

Back to Manchester in April 1941, OB joined Hartree's Magnetron Group. As an employee, getting a salary of L 400 a year (Flowers 2009) and paying taxes, he worked for the Ministry of Supply on the development of British Radar. The members of the magnetron group investigated how to produce microwaves of a given wavelength useful for radar - of a wavelength that the German Luftwaffe could not jam. Mathematically that meant: numerical simulation of electron trajectories in magnetron devices. (Buneman Papers 2011; Fischer 2003; Meyer-Spasche 2011)

His Ph.D. certificate is dated May 1st 1942, but he had essentially finished work on his thesis before he was interned. Since he had not finished officially, he could use the address of the mathematics department as his postal address while interned. (Buneman Papers 2011)

In June 1942 he married Mary Frances Behrens (*1921) from the well-known mercantile family Behrens of Manchester. Several of her ancestors were German: her great-grandfather Sir Jacob Behrens (1806 - 1889) was born in (Bad) Pyrmont in Germany to a Jewish textile-making family. He moved to England in 1834. He founded there the company 'Sir Jacob Behrens & Sons Ltd' and thus became one of the founders of the Bradford wool textile industry. His eldest son Gustav married Fanny Warburg from the famous Warburg banking family of Hamburg. Their youngest son Sir Leonard Frederick Behrens was the father of Mary. OB and Mary got married at a Parish Church in West Didsbury in the County of Lancaster. An unwanted side effect was that Mary lost her British citizenship for a time, had to carry an identity card proclaiming her German citizenship, and was considered a potential 'enemy alien', though her husband was already classified as a 'friendly alien' at that time. (Flowers 2009; Buneman M 2013; Buneman Papers 2011)

During the war OB could not exchange letters with his parents in Hamburg. But he sent them short notes with help of the Red Cross. In the beginning, 'I am fine, Oscar'; then 'we are fine, Oscar and Mary' and after the birth of their son O. Peter in 1943 'we are fine, Oscar, Mary and Peter'. So his parents became informed about his growing new family in England. (Bünemann G 2010)

When the work of the magnetron group came to an end, Professor Mark Oliphant offered OB a job in the Manhattan project. It was suggested that he work on the separation of uranium isotopes, using the expertise he had obtained in the magnetron group. Mathematically that meant doing ion optics, i.e. computing trajectories of charged particles again. This work, however, was to be done in Berkeley, California. In February 1944 he

obtained British nationality (Buneman Papers 2011, Certificate of Naturalization). As a member of the British delegation to the Manhattan project, he obtained diplomatic status. Towards the end of their stay in Berkeley, their second son Michael (* Aug 1945) was born. (Buneman M 2013; Flowers 2009)

4 Oscar Buneman (1945 - 1993)

When the Manhattan Project came to an end in the summer of 1945, OB appeared to be free to plan his future and to decide about his further scientific career. It seemed clear to him that he would continue to work in the field of nuclear research. He had two offers from England. One offer was from Profs Peierls and Oliphant to work with their team at the University of Birmingham. This offer was turned down by the Bunemans: the salary seemed too low to support a family with two children. OB accepted the other offer. It meant joining the team led by Profs John Cockcroft and James Chadwick for the *Canadian and British Atomic Energy Projects*. The project was started in the late thirties in England, moved to Montreal during the war, but was not intensely pursued during the Manhattan project. After the war it was intensified in Montreal, and its return to England was planned in Montreal. It was clear that it would be too dangerous to do this work at a university in the middle of a city. So it was decided to found the new site *Harwell*, far enough away from a place with dense population, but close enough

to a university for using their facilities (library, lecture halls, hospitals etc.) and to a (military) airport 'to allow a flying start'. (Flowers 2009; Cockcroft 2013)

OB probably would have liked to stay in the US. He applied for several jobs there. Documented are a letter to Prof John C. Slater at Massachusetts Institute of Technology (July 1945) and an application to return to the Lawrence Berkeley Laboratory, University of California (Dec 1945). Prof Slater and George Everson (in the name of Prof Lawrence) answered essentially in the same way: 'We are planning here work you would be very interested in, we would love to have you here, but we do not have an adequate permanent position for you *alien*. We can only offer you to join our staff while you are awaiting the time for a suitable opportunity in the academic field to present itself.' Slater added that OB's offers for returning to England are probably more interesting. Everson asked him to complete a Personnel Security Questionnaire. In an intermediate answer in Feb 1946 he reported clearance by the District and promised a definite offer as soon as he would get clearance from the University. (Buneman Papers 2011, letters) This definite offer came in March 1946, when they were in Montreal for about half a year. OB used it for negotiating better conditions for his position at Harwell (Flowers 2009).

In the fall of 1945 they used a vacation of three weeks to travel by car from Berkeley to Montreal, with stunning sightseeing on the way: Mojave desert, Las Vegas, Grand Canyon, Bryce Canyon and the Rocky Mountains. In Denver it became clear that they had left the climate of permanent spring: it was fall, real autumnal weather that they had not seen since they left England. When they arrived in Montreal, settling down turned out to be much more difficult than it had been in Berkeley: in Berkeley, a house had been waiting for them, even with a filled refrigerator. In Montreal they were told that they have to find housing themselves. And that was very difficult in those days. First they lived in a place that was 25 miles (about 40 km) outside of Montreal, with bad transportation conditions. Later they moved into the city, into a flat that was quite unpleasant. Both places were quite uncomfortable, the rents were quite high, and heating was a problem in an unusually cold winter (-35 degrees Fahrenheit approximately -37 degrees Celsius occurred, while the minimum in the years 1950 - 1953 was higher, e.g. in the winter 1952/1953 it was only -8 degrees Fahrenheit approximately -22 degrees Celsius (Flowers 2009; Weather underground 2013)). Another problem in Montreal was that they did not get a paycheck for several months (the responsible person had embezzled the funds), so they were forced to live on loans. (Flowers 2009)

In the spring of 1946 they returned to England. The big advantage was that they could be in direct contact with their parents and other relatives again, visiting each other. But the

facilities for daily life were not much better at the newly established *Atomic Energy Research Establishment (AERE)* in Harwell than in Montreal - maybe even worse. Since the whole place was constructed in a hurry under post-war conditions, normal facilities of cities were missing: no shops, cinemas etc., and they had to live in prefabricated row houses, '*tiny tin boxes*', which gave the place '*the general appearance of a penal colony*'. In addition, the responsible administrative people were persons close to the military. They were not as friendly as people in the American West. And the Bunemans felt shortages due to the war, e.g. they did not get enough fuel to drive to Manchester. In California and Canada they knew about the war, but they did not feel it in daily private life. '*Never before had I felt so humiliated nor so homesick for the wonderful, convenient United States*'. (Flowers 2009) Mary had a massive re-entry culture shock. Maybe this was one of the reasons why the couple separated some time later and got officially divorced in September 1951. Both got remarried shortly afterwards: Mary in 1951 to Brian Flowers, Baron Flowers, FRS (1924 - 2010). Oscar married Ruth Eades (*1929) in April 1952. They have two sons. (Flowers 2009; Buneman Papers 2011)

Many scientists can cope with difficult living conditions if their work is very interesting and working conditions are satisfactory. At the beginning that seemed to be the case at AERE. Many scientists there were quite young, came from various countries of the British Empire or had returned from USA or Canada, and were '*bursting with excitement and hope for the future of the new venture*' (Flowers 2009). Later on that changed. In 1948, OB typed a letter to '*Dear Sir John*', with copy to Klaus Fuchs, the head of the theoretical physics department, complaining about his working conditions and the subject of his work '*...The possibility of making "fundamental contributions" in pile work and the scientific appeal of the work (limited in any case by the continued security restrictions) is decreasing rapidly...*'. It seems, however, that he did not send these letters: one copy (the original), in an envelope addressed '*PERSONAL, To Sir John Cockcroft*' (the director of AERE), and a copy without envelope are contained in the collection '*Buneman Papers*', (Buneman Papers 2011).

Around 1950, there were several changes at AERE. When Klaus Fuchs was uncovered as a spy, security regulations were severely increased, and several people were recommended to leave, including OB. OB was probably not unhappy to leave AERE and Harwell to become university lecturer for mathematics at Cambridge University in 1950. His scientific interest, however, was no longer in mathematics. It had shifted during the past years. During his Cambridge years he published on problems in electrodynamics and plasma physics (cosmic plasmas, fusion plasmas). He followed the publications on magnetrons. He published new ideas about magnetrons as well as some de-classified previously secret military work on magnetrons when he found that some of his old results still were not known publicly. In the academic year 1957/58 he spent a sabbatical at Stanford University. During this stay, he had access to the biggest and fastest computer of that time and he did (one of) the first numerical simulations of plasma particles. The paper resulting from this work was not only his most cited paper, it turned out to be a citation classic in 1984: 25 years after its publication it was the most cited paper in the field. (Meyer-Spasche 2011)

In 1960 he returned to the Bay Area for good: he became Professor of Electrical Engineering at Stanford University, heading a plasma research institute there until his retirement in 1984. From 1984 until 1993 he was emeritus at Stanford, affiliated to STARLab (Space, Telecommunications and Radio science Lab) (Buneman Papers 2011).

During his time at Cambridge and Stanford he did a lot of international traveling, attending meetings and teaching at summer schools. Also, he spent several sabbaticals: one academic year at ESRIN (European Space Research INstitute) at Frascati, Italy in 1969/70, and one quarter (April to July) in 1976 at University of Reading, England. 1993 - 1995 he was post-humously a co-author of 5 publications. (Meyer-Spasche 2011; Buneman R 2011)

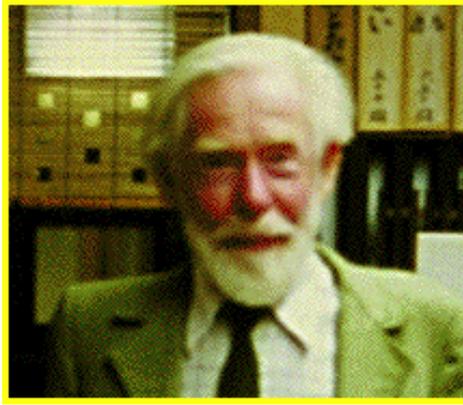


Figure 1: Oscar Buneman (Langdon 1993, oscar.gif)

5 Oscar Buneman, the Cosmopolitan

Stanford students about OB: 'OB was always accurately dressed, with a tie, as you would expect that traditionally for a professor. He spoke excellent English with a strong British accent. We thought that he was British by birth. His lectures were always very clear and mathematical, with nice, readable writing on the blackboard. 'Elegant' was a word he often used, like 'this method works, but it is not very elegant' ' (Larson 2011). Another former student: 'He was one of the nicest persons I have ever met.' (Bolstad 2011)

His friends reported that he was what Californians call 'an outdoors person': he used to hike in the mountains, ride his bike to work, and sleep outdoors until the winter rains began. (Buneman et al 1994)

Anything typically German? As already mentioned, he considered *mathematical elegance* a very important issue. Remarks about it are also to be found in several of his publications. Certainly Artin's lectures in Hamburg were examples of elegance, certainly the present author learned at German universities that mathematical elegance is worthwhile. But at international meetings elegant talks are given by authors from many different nations.

OB and his wife Ruth were *extremely concerned about environmental issues*: since 1974 they had solar panels in their garden for heating their swimming pool. They kept chickens in their garden for producing eggs. They rode their bikes daily uphill in the very steep Los Altos Hills, to the amazement of their neighbors. (Buneman R 2011; Buneman M 2013; Clare 2011)

Acknowledgments: I am grateful to all who provided relevant informations and to all who improved this work by their questions and remarks. Special thanks are due to Lady Mary Flowers, Gertrud Bünemann, Ruth Buneman, and especially Michael Buneman, who also provided the private documents cited here. And to those friendly persons who allowed and helped me to access the archives in Hamburg and Stanford. Also I want to thank the organizers of the meeting 5 ESHS and the organizers of the symposium 'Scientific Cosmopolitanism' Eberhard Knobloch, Suzanne Debarbat and especially George Vlahakis.

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