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Original Paper

My Research Collaborations with German Scientists and Scientific Institutions over the Past Six Decades

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Abstract

Over the past six decades, I have maintained research connections with German scientists and scientific institutions while pursuing an academic career focusing on scientific discoveries of the physical properties of minerals at high pressures and temperatures. During this period, I have also visited many research laboratories in Germany, including Bayreuth, Berlin, Frankfürt, Giessen, Hamburg, Karlsruhe, Kiel, Mainz, Marbach, Munich, Potsdam, and Stuttgart. The objective of this paper is to relate this history.

Keywords

mineral physics, german scientists, research collaborations

1. Introduction

Over the past decade, I have concentrated on writing papers on my history pursuing a scientific career in mineral physics. Recently, I have published papers on my research collaborations with French, Czech, Chinese, Russian and English scientists in the International Journal of Geosciences (Liebermann, 2021 a,b,c; 2022 a,b). This new paper is of a similar genre, with the notable difference that it documents my collaborations with both German scientists and scientific institutions in Germany. As will become clear in what follows, not all my connections with German scientists have occurred in Germany and not all scientists with whom I have collaborated in scientific institutions in Germany were Germans. Finally, I document my German heritage.

2. The Lamont Years in the 1960s

During my graduate studies at the Lamont Geological Observatory of Columbia University (see Liebermann, 2019a), I met many prominent geophysicists from other countries, who had been invited by Jack Oliver, head of the seismology department. Among these was Hans Berckhemer, who had extensive interactions with Oliver, Maurice Ewing and Frank Press, as well as we graduate students. I later visited Berckhemer in Frankfurt am Main in Germany (see below).

Figure 1. Hans Berckhemer

Several other graduate students were from Germany. My first office mate was Goetz Büchbinder, who was born in Germany and obtained his M.S. degree in Nova Scotia. Klaus Jacob was a student in geomagnetism whom I later visited in Melbourne, Australia.

Another German student in seismology was Jörge Ansorge. In 1967, I attended the IUGG Congress in Zürich and presented a paper with Paul Pomeroy on the "Relative excitation of surface waves by earthquakes and underground explosions". After the Congress, I visited Ansorge in Karlsruhe with Art McGarr. That was my first visit to Germany and included Rottweill and Reutlingen while exploring my German heritage (see details below). Ansorge later moved to ETH in Zürich to join research group of Stephan Mueller.

Hartmut Spetzler (see Figures 2 and 3 below) was my contemporary in graduate school, Hartmut at Caltech and me at Columbia. We met for the first time when he visited Orson Anderson's mineral physics lab at Lamont to consult with Orson and Edward Schreiber. Hartmut had been tasked with establishing an ultrasonics laboratory at Caltech by Don Anderson. Over the subsequent years, we have maintained close connections, most recently in 2016 when we both attended a meeting of the European High-Pressure Research Group in Bayreuth. When Hartmut was on sabbatical at the University of Mainz, I drove with him and his wife Ria to visit Hartmut Kern in Kiel.

3. The ANU Years in the 1970s

From 1970 to 1976, I was on the research faculty of the Research School of Earth Sciences of the Australian National University (ANU) in Canberra and worked in the laboratory of Ted Ringwood (see Liebermann, 2020). There I met Gerhard Brey who was a student of David Green. Back in Germany, Gerhard had a short stint at the University of Hannover, before moving as a research scientist to the Max-Planck-Institute for Chemistry in Mainz (1978-1994). There, he built his experimental petrology laboratory, in the Cosmochemistry division headed by Heinrich Wänke. In 1994, Gerhard took the position as Chair of Geochemistry and Petrology at the Johann Wolfgang Goethe University in Frankfurt am Main, Germany. Somewhat later I visited him in Frankfurt with Berckhemer in my role as President of COMPRES (Consortium for Materials Properties Research in Earth Sciences).

At the 1973 meeting of the International Association of Seismology and Physics of the Earth's Interior [IASPEI] in Lima, Peru, Charles Drake encouraged me to organize a workshop in Eastern Europe, so that young scientists from countries in Eastern Europe could attend. Vládislav Babuška, Jaroslava Plomerová, Vlastislav Červený and I had convened the first of these workshops in 1976 at the Castle of Liblice in central Bohemia on "Anisotropy and Heterogeneity of the Lithosphere" (Babuška and Liebermann, 1977). There were many German scientists at the Liblice workshop, including Heiner Vollstädt and Heinz Stiller from the Central Institute of for Physics of the Earth (ZIPE), which was an institute of the Academy of Sciences of the GDR (German Democratic Republic) in Potsdam.

Figure 2. The Workshop in Liblice Was Attended by 75 Scientists from 12 Countries. German IDs: Heiner Vollstädt—Third to Right of Manghnani; Heinz Stiller-behind Vollstädt; Karl Fuchs; Hartmut Spetzler

Figure 3. Rick O'Connell, Enzo Boschi, Francesco Mulargia, Brian O'Connell, Hartmut Spetzler at Liblice in 1976

4. The Stony Brook Years from 1976 to Present

In 1976, I moved from the ANU to Stony Brook University to join the faculty of the Department of Geosciences (see Liebermann, 2019b). Over the ensuing years, I have had extensive research collaborations with staff of German scientific institutions.

In1981, I was invited by Fritz Rummel and Werner Schreyer to participate in an international meeting in Bad Honnef and presented a paper on the elasticity of minerals at high-pressure and temperature (Liebermann, 1982). The work presented in this paper was an outgrowth of research performed at the ANU in Canberra and with Barbara Leitner and Peter Lellis at Stony Brook. Before the meeting, I visited the laboratory of Hans Berckhemer in Frankfurt and Hartmut Kern in Kiel.

Today, there are two prominent institutes of geosciences in Germany: the Bayerisches Geoinstitut (BGI) in Bayreuth and the GeoForschungsZentrum (GFZ) in Potsdam, both of which I have visited in the past 30 years. In the following sections, I describe my collaborations with these institutes and the scientists who have worked there.

4.1 Bayerisches Geoinstitut (BGI)

In the early 1980s, while chairing a committee for the Bavarian science ministry to examine the state of Earth Sciences in Bavarian universities, the physical chemist Ulrich Franck of the University of Karlsruhe suggested that geosciences in Germany would benefit from an institute focused on the experimental investigation of the Earth. The ministry encouraged a plan to be drawn up that was further developed by the petrologist Werner Schreyer of the Ruhr-University; Schreyer's plan proposed the establishment of the Bavarian research institute for experimental Geochemistry and Geophysics or Bayerisches Geoinstitut (BGI). I served on the search committee for a director of BGI along with Hans Berckhemer.

On the 1st April 1986 Fritz Seifert became the founding director of the new Geoinstitut established at the Universität Bayreuth, which was itself at the time only 11 years old.

Geoinstitut staff in the year 1987

Figure 4. The Staff of BGI as of 1987; Director Seifert is 3rd from the Right; Sharon Webb Is First on the Left

Over the next 5 years, the staff of BGI grew rapidly and attracted many international visitors.

Continuities: growing staff, the group in 1992

Figure 5. The Staff of BGI in 1992.

Note. Catherine McCammon is first on left in front row; Seifert is 3rd to her left; Dave Rubie is on his left. Sharon Webb is 1st to left of him; Don Dingwell is just behind and to the left of her; Tomo Katsura is 3rd to left of Webb in front row.

Figure 6. International Visitors to BGI

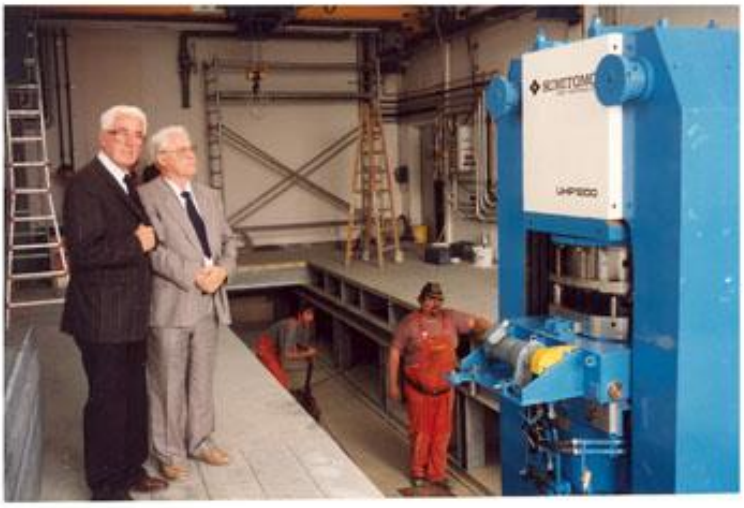
Jean-Paul Poirier often visited Bayreuth to work on transmission electron microscopy investigations with Falko Langenhorst, who is now a Professor of Mineralogy at the University of Jena.

Evolution of large-volume, high-pressure apparatus at BGI (Frost *et al*., 2004).

Eiji Ito was a graduate student at Osaka University and worked with Naoto Kawai, the original inventor of Uniaxial Split-Sphere Apparatus (USSA). Ito later moved to Misasa, Japan to the Institute for the Study of the Earths's Interior (ISEI) and installed a 5000-ton version of the USSA. This USSA-5000 apparatus manufactured by Sumitomo Heavy Industries later served as the model for multi-anvil laboratories at Stony Brook University in the U.S. (Liebermann, Charles Prewitt and Donald Weidner), at the University of Alberta in Canada (Christopher Scarfe), and the Bayerisches Geoinstitut in Germany (Dave Rubie).

When Dave Rubie moved from the University of Manchester in England to BGI in 1998, he visited Ito in Misasa and our laboratory in Stony Brook. Rubie's Sumitomo 1200-ton press arrived at BGI in September 1989 and was the first USSA multi-anvil apparatus to be installed in Europe. A second press, an overhauled industrial version called Hymag, was installed at BGI in 1991; this press was originally used in Ulrich Franck's lab in Karlsruhe in conjunction with a belt-type apparatus. I was able to see both of these presses when I first visited BGI in 1992.

The third multi-anvil apparatus at BGI was a 5000-ton press installed in the mid-1990s, also manufactured by Sumitomo; its installation was observed by Ulrich Franck and Franz Görlich.



Ernst Ulrich Franck and Franz Görlich watching the installation of the Sumitomo press

Figure 7. Ulrich Franck and Franz Görlich Observing the Installation of the 5000-ton Sumitomo Press at the BGI

Figure 8. Dave Rubie and Colleague Unpacking Boxes at BGI for the Operation of the 5000-ton Press

After Dave moved to BGI in 1998, he collaborated with Takehiko Yagi to convene the 5th High Pressure Mineral Physics Seminar in Verbania, Italy in 2002. Many German scientists attended that seminar, as well as the subsequent ones in 2007 on Matsushima Island near Sendai, Japan, in 2012 on Lake Tahoe in Granlibakken, Calfornia and 2017 in St. Malo, France (Liebermann, 2014).

BGI Visitors Program

Throughout its history, BGI has generously invited visitors to work with the staff in Bayreuth. One of these visitors has been Steve Jacobsen (initially from the University of Colorado where he was a graduate student of Joe Smyth and Hartmut Spetzler).

Steve spent two years of his graduate career at BGI working with Hans-Josef (Hanni) Reichmann to develop techniques to perform GHz ultrasonics experiments in a DAC. One of their projects is illustrated below.

"Every good single-crystal, diamond-anvil experiment must start with a good multi-anvil experiment".

Figure 9. 5000-ton Press at BGI [Courtesy of BGI]

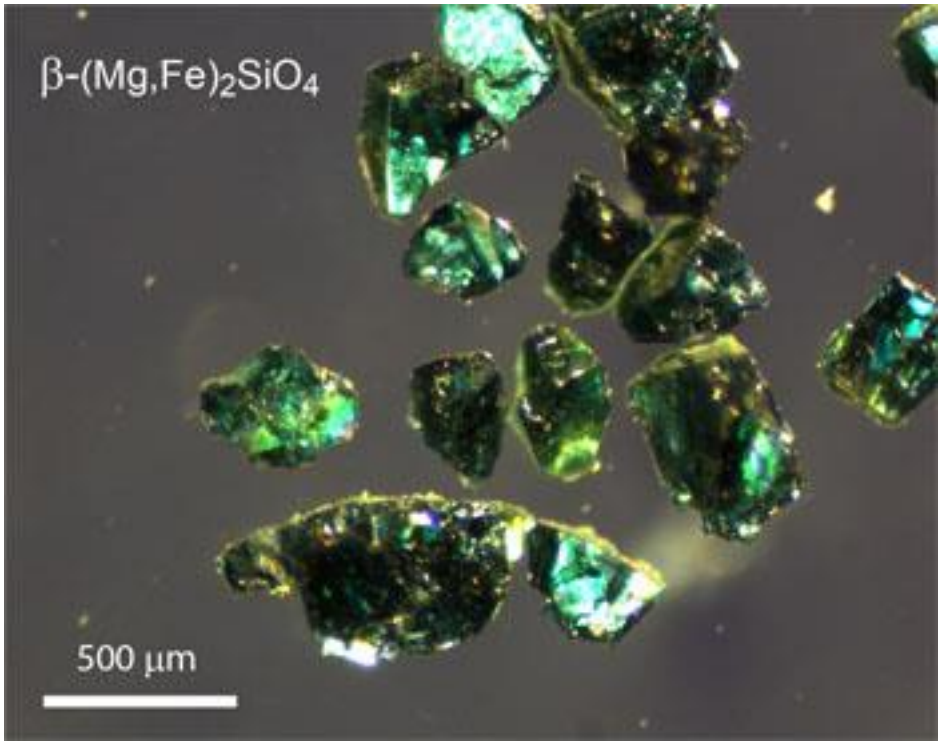


Figure 10. Single Crystals of Hydrous Wadsleyite Synthesized in the 5000-ton Press at BGI by Steve Jacobsen [photo courtesy of Steve Jacobsen]

Jacobsen used these large crystals to perform high-temperature acoustic experiments in a new diamond-anvil apparatus he developed in collaboration with Reichmann and Anastasia Kantor from BGI and Hartmut Spetzler (Jacobsen *et al*., 2005). In this apparatus, shear waves were generated by reflecting P waves into vertically-polarized S waves, thus allowing simultaneous measurement of both compressional and shear wave velocities.

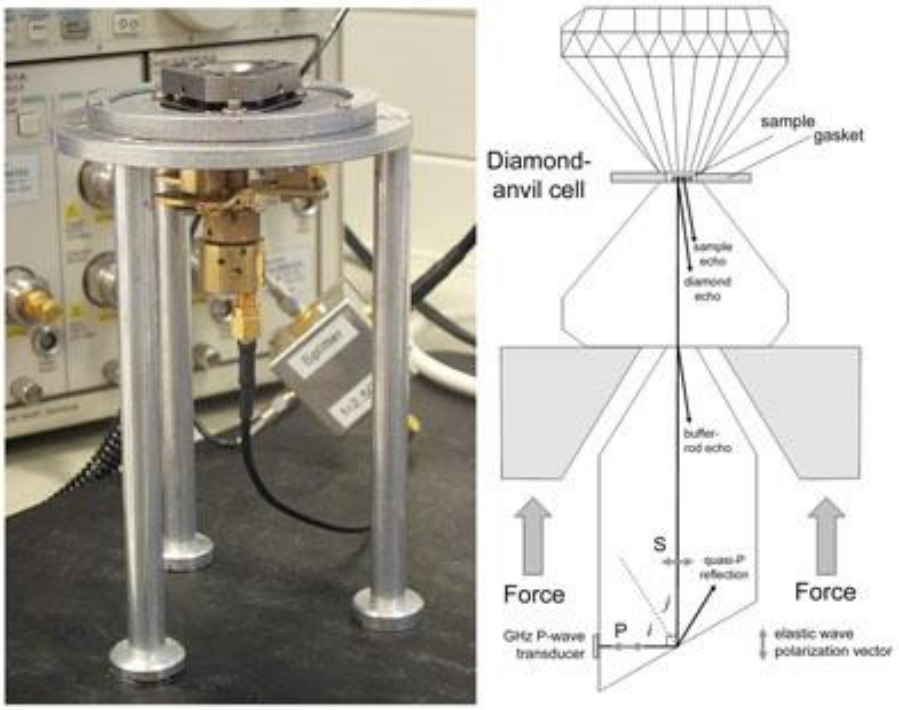


Figure 11. Diamond-anvil Apparatus Designed to Conduct Gigahertz Ultrasonic Experiments at High Pressures and Temperatures [13]

Their data on hydrous wadsleyite were published in Jacobsen's 2006 review paper (Jacobsen, 2006).

Figure 12. Steve Jacobsen and Hartmut Spetzler at Retirement of Joe Smyth from University of Colorado

Note. Joe Smyth has published many crystallographic papers using large single crystals from BGI in collaboration with Dan Frost, who is now in charge of the large presses.

Other Staff at BGI and my research connections

Catherine McCammon: I first met Catherine when she was a graduate student at the ANU in the 1970s and have followed her career with interest and admiration in subsequent years. Her research considers mantle processes and geochemistry, as well as the crystal properties of minerals, with an emphasis on the characteristics of iron in high-pressure materials and measuring their oxidation states and spin transitions using Mössbauer spectroscopy.

Tomo Katsura: PhD from Okayama University in Misasa and currently a Professor at BGI.

Gerd Steinle-Neumann: PhD at University of Michigan with Lars Stixrude and then postdoc at the Geophysical Laboratory with Ronald Cohen. Now a Professor at BGI, focusing on theoretical mineral physics.

Leonid Dubrovinsky and Natalia Dubrovinskaia: Specialists in X-ray diffraction studies at the European Synchrotron (ESRF) and laboratory studies using Mössbauer spectroscopy. Both are Professors at the University of Bayreuth.

Tiziana Boffa-Balaran: Her student Julien Chantel visited Stony Brook and Argonne National Laboratory to consult with Baosheng Li and Yanbin Wang on high-pressure ultrasonic experiments in conjunction with X-ray radiation. She also collaborated with Dubrovinsky and Razvan Caracas on study of ferroelastic phase transition in aluminosilicate hollandite (Boffa-Balaran *et al*., 2009).

Sharon Webb: A PhD student of Ian Jackson at the ANU, Sharon and her protégé Ruth Knoche have developed techniques for performing ultrasonic interferometry experiments in multi-anvil presses (Knoche *et al*., 1997). This work closely parallels work in my laboratory at Stony Brook by Baosheng Li (Li *et al*., 1996); interestingly, both endeavors can be traced to Ian Jackson at the ANU.

Sharon is now a professor of physical chemistry and mineralogy at the Georg-August-University in Göttingen.

GeoForschungsZentrum (GFZ) in Potsdam

The **GFZ German Research Centre for Geosciences**, also known as **GFZ Helmholtz Centre Potsdam** or just **GFZ**, is a national research center for Earth Sciences in Germany located on the Telegrafenberg in Potsdam, in the German federal state of Brandenburg. It is part of the Helmholtz Association of National Research Centres.

"GFZ" stands for *GeoForschungsZentrum* (Geo-research Centre).

GFZ was established after re-unification of Germany on Oct 3, 1990. It is the latest in a long line of research institutes that have been located on the Telegrafenberg of the Academy of Sciences of the GDR (German Democratic Republic, including the Institute for the Physics of the Earth (ZIPE). The history of the GFZ can be traced back to the Geodatisches Institut Potsdam, an institution of the Prussian Academy of Sciences. Under the directorship of Friedrich Robert Helmert from 1886 to 1917, the institute developed into the world's leading center for scientific geodesy. GFZ is the successor of ZIPE, where Heiner Vollstädt and Heinz Stiller had been working.

Under the leadership of Heiner Vollstädt, ZIPE decided to construct a split-sphere apparatus with the objective of attaining pressures of 1 Mbar; however, the water used as the pressure medium could not generate sufficient pressure to achieve this goal. This apparatus is now on display at the GFZ in Potsdam.

Figure 13. Split-sphere Apparatus from the ZIPE in Potsdam in the Late 1970s, now at the GFZ lobby (courtesy of Hans-Joachim Mueller)

My principal interaction with scientists at the GFZ has been with Hans-Joachim Mueller, who was initially on the staff of ZIPE. After the reunification of Germany, he began to attend seminars at the free university of Berlin, where he first met Frank Schilling. They commenced a collaboration focused on utilizing large-volume presses installed at the Deutsches Elektronen-Synchrotron (DESY), MAX80 then MAX200x. In 2006, Hans moved with Schilling to the Karlsruhe Institute of Technology (KIT).

In a pioneering effort, a modified DIA apparatus was designed by a team led by Osamu Shimomura and Takehiko Yagi and installed on an X-ray beamline at the Photon Factory of the National Laboratory for High Energy Physics (KEK) in Tsukuba, Japan; it was called MAX-80 for "multi-anvil-type X-ray system designed in 1980". Our Stony Brook copy of MAX-80 was installed on beamline X17B2 at the National Synchrotron Light Source of the Brookhaven National Laboratory and was christened SAM85 in honor of Osamu Fukunaga who helped design it and Osamu Shimamura who helped install in at Stony Brook in 1985. A similar MAX-80 was acquired by Eckhard Hinze at University of Giessen in the late 1980s and in 1991 installed on the DOuble RIng Store III ring of the HAmburger SYnchrotron LABoratory (HASY-LAB) at the DEutsches Elektronen SYnchrotron (DESY) in Germany. Later, a larger MAA designed to reach pressures of 25 GPa was installed at HASYLAB and named MAX200x. See papers by Mueller and colleagues for additional details of MAX80 and MAX200x experiments (Mueller *et al*., 2006).

Figure 14. MAX-80 in Germany

Note. Transferred from the laboratory of Eckhard Hinze in Giessen to the GFZ in Potsdam for preparation to install at DESY in 1991 (courtesy of Hans-Joachim Mueller)

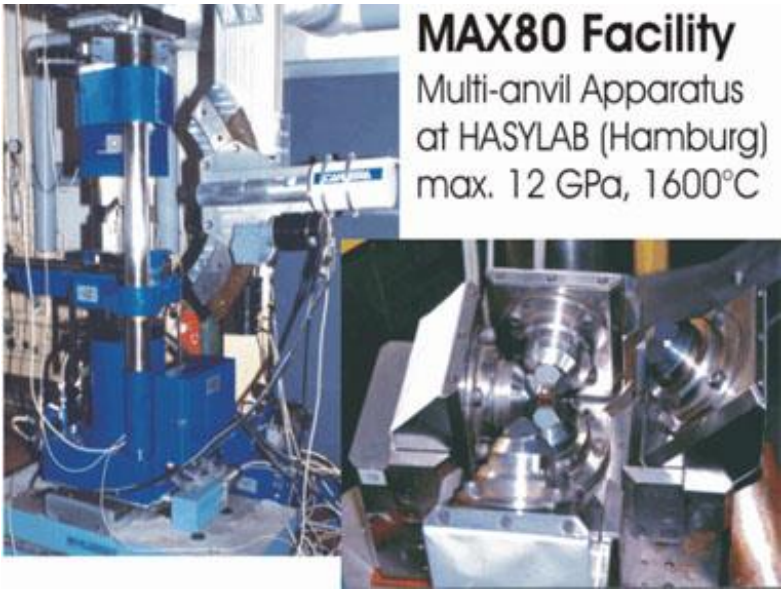


Figure 15. MAX80 at HASYLAB

Figure 16. MAX200x at DESY with Hans-Joachim Mueller, Max Voggenreiter and Frank Schilling (courtesy of Hans-Joachim Mueller)

Figure 17. MAX200x at DESY in 2009 with the Author and Hans-Joachim Mueller (copyright R. C. Liebermann)

Hans Mueller visited our high-pressure laboratory at Stony Brook on several occasions. First with Frank Schilling and others when they were preparing to install MAX200x at DESY and subsequently to discuss ultrasonic experiments in our multi-anvil, high-pressure apparatus with Baosheng Li. During the latter visit, Hans and his colleague Joern Lauterjung conducted a successful experiment on the sound velocities of anorthite with Baosheng Li.

I first visited the GFZ in 2003 when I was a visiting professor at the Université Paul Sabatier in Toulouse, France, on sabbatical leave from Stony Brook. Later when I was the President of COMPRES, I visited DESY and talked with Director Edgar Wecker on the importance of high-pressure mineral physics experiments at synchrotrons.

Other scientists at GFZ with whom I have maintained connections

Hans-Josef (Hanni) Reichmann: Formerly at BGI and now on faculty of GFZ; a continuing interest in the elastic properties of minerals, using both GHz interferometry and Brillouin spectroscopy.

Monika Koch-Müller: Research interests in the stability, phase relations, crystal chemistry and crystal physics of Earth materials. We have met at several meetings of the EHPRG in Bayreuth.

Hauke Marquardt—On staff of GFZ and also an Associate Professor at Oxford University in Britain. Collaborator on Brillouin scattering experiments with Sergio Speziale and Tom Duffy.

Sergio Speziale: Led the review paper on Brillouin scattering and its applications in geosciences with Hauke Marquardt and Tom Duffy (Speziale *et al*., 2014).

Potsdam is also famous for its castle of Sans Souci, built by King Frederick II of Prussia, who was a good friend of the French philosopher Voltaire, with whom he maintained an extensive correspondence.

Figure 18. Sans Souci Castle in Potsdam: Home of Prussian King Frederick II (aka Frederick the Great), with whom Voltaire Corresponded

Note. Voltaire visited Sans Souci in 1750. I visited with my wife Barbara in 2003.

Figure 19. Frederick the Great and Voltaire at Sans Souci in 1750

4.2 Other German Scientists and German Institutions

Hartmut Kern at the Christian-Albrechts-Universität in Kiel. His laboratory, which I visited in 1981, includes a triaxial press with cubic anvils.

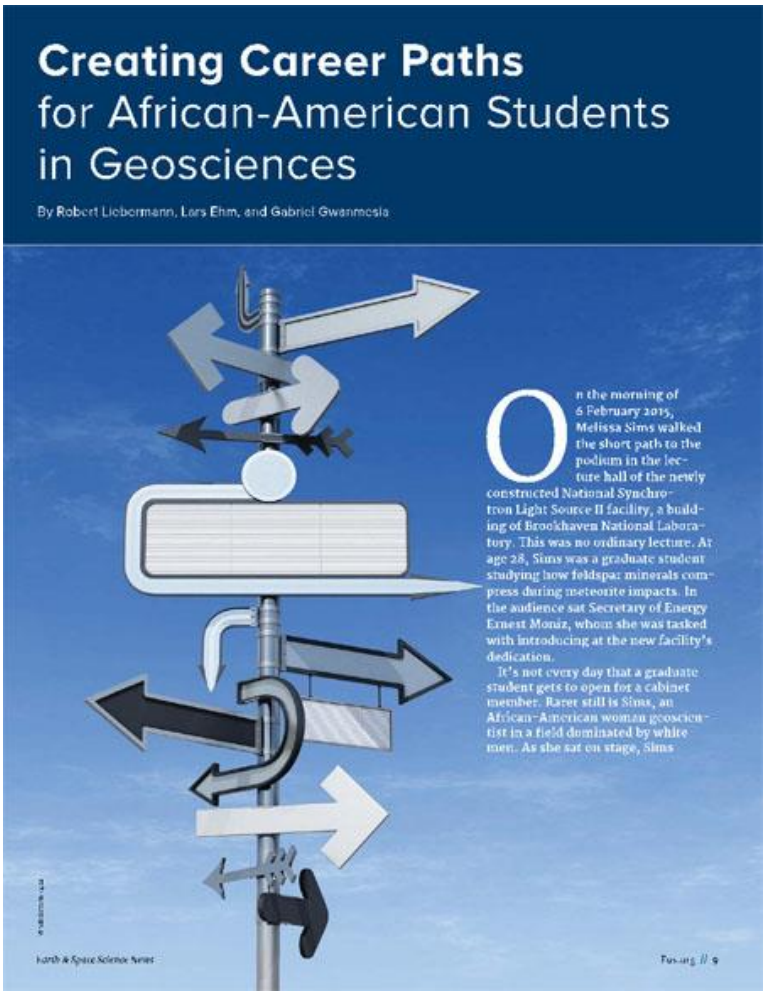
Reinhard (Reini) Boehler: Graduate student in the laboratory of George Kennedy at UCLA. Formerly director of Max Planck Institut für Chemie, Mainz, Germany and Research Scientist at the Geophysical Laboratory of the Carnegie Institution of Washington. Now at Oak Ridge National Laboratory after leaving Carnegie and eFree. When he was being considered for a position at the Max-Planck-Institut für Chemie in Mainz, I was pleased to offer my strong support for his candidacy. At Mainz and more recently at Carnegie, Reini has pioneered new types of diamond-anvil cells for high-pressure research, most notably a large-volume DAC for neutron diffraction studies.

Karl Syassen: At the Max-Planck-Institute fur Festkorperforschung in Stuttgart.

We met most recently at the EHPRG in Bayreuth in 2016. Syassen told me that he was born in Rottweil and I later visited him in Stuttgart (see below for my family's connection to Rottweil).

Lars Ehm: Now Associate Professor in Department of Geosciences at Stony Brook. PhD from Christian-Albrechts University in Kiel in Department of Mineralogy in crystallography group, led by Prof. Dr. Wulf Depmeier.

Co-Principal Investigator with Liebermann and Gabriel Gwanmesia (Delaware State University) on diversity initiative on Career Path for African-American Students from Historically Black Colleges and Universities (HBCUs) to National Laboratories of the U.S. Department of Energy.



Creating Career Paths for African-American Students in Geosciences

By Robert Lieberman, Lars Ehm, and Gabriel Gwanmesia

On the morning of 6 February 2015, Melissa Sims walked the short path to the podium in the lecture hall of the newly constructed National Synchrotron Light Source II facility, a building of Brookhaven National Laboratory. This was no ordinary lecture. At age 28, Sims was a graduate student studying how feldspar minerals compress during meteorite impacts. In the audience sat Secretary of Energy Ernest Moniz, whom she was tasked with introducing at the new facility's dedication.

It's not every day that a graduate student gets to open for a cabinet member. Rarer still is Sims, an African-American woman geoscientist in a field dominated by white men. As she sat on stage, Sims

Figure 20. EOS, Earth and Space Sciences News, Vol. 97, Issue 13, pp. 9-11, 1 July 2016

4.3 Germans and German Institutions

Germans in non-German institutions

Ekhard Salje

Lars Ehm

Hartmut Spetzler

Stefan Klotz

Reinhard Boehler

Helmut Schloessin

Goetz Büchbinder

Non-Germans in German institutions

Dave Rubie

Dan Frost

Steve Jacobsen

Sharon Webb

Tomoo Katsura

Catherine McCammon

Leonid Dubrovinsky

Natalia Dubrovinskaia

Sergio Speziale

My German heritage

I am descended from German ancestors on both the side of my paternal grandfather (Karl Gottlob Liebermann) and my paternal grandmother (Anna Weitershausen Liebermann).

On the Liebermann side, my earliest known ancestor is Franz Liebermann (1670-1737). He married the widow of the beer brewer in Rottweil. This brewery was founded in the 12th century and the Liebermanns owned it for 3 generations before it passed out of the family. The brewery building still exists and I have seen it when I was in Rottweil in 1967. It is outside the town wall on the bank of the river below.

On side of Anna Weitershausen, my cousins Alfreda Liebermann and Mary Anna MacQueen have done extensive research, including a visit to Germany in the 1990s. Via my paternal great-grandfather, Carl Weitershausen we are related to Lucas Cranach the Elder (1472-1553), the German Renaissance painter who was a close friend of Martin Luther. We are eventually related to Charlemagne (747-814 AD) Emperor of the Roman Empire (800-814) via St. Elizabeth of Hungary (1207-1231). St. Elizabeth of Hungary was the wife of Ludwig IV of Thuringia (1200-1227). I am her descendant thru her great-great-great grandson Ludwig I of Lower Hesse and his mistress, Margarethe von Hozheim. By way of her husband, I am a descendant of Charlemagne.

Figure 21. My Great-grandfather (urgroßvater) Was Roman Constantin Liebermann, Who Was Born in Rottweil in 1848 and Married in Reutlingen in 1873

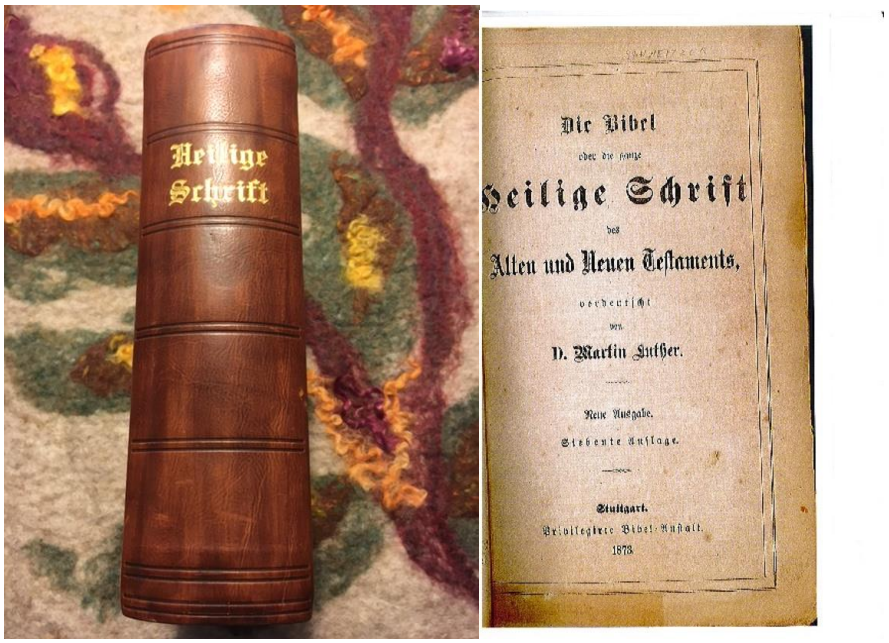


Figure 22. One of Roman's Wedding Gifts Was a Holy Bible (Heilige Schrift), a Martin Luther Version

Since 1873, this Holy Bible has been in the Liebermann family, to be inherited by the oldest son, who has a son of the Protestant faith. Thus, the Liebermann family bible has passed from Roman to Karl Gottlob (1930) to Harold (1969 to my father) and to me (2000). It now resides in a bookcase in our home in East Setauket, New York.

5. Dedication to Johannes and Ingrid Voigt of Marbach-am-Neckar, Germany

My wife Barbara and I first met Johannes and Ingrid Voigt when Johannes and I were both on the research faculty of the Australian National University in Canberra. We both lived in the university flats in the nearby suburb of Garran. Johannes and I often babysat for our young daughters, Carmen and Karen at the sandbox near our flats. While the girls played, we discussed the affairs of the world; actually, I mostly listened while Johannes lectured.

Since the 1970s when both of our families moved back to the Northern Hemisphere, we have often visited the Voigts in Marbach. Our most recent visit was in 2016.

Figure 23. Ingrid and Johannes Voigt with My Wife Barbara in Marbach-am-Neckar in 2016

6. Conclusion

This paper summarizes my research collaborations with German scientists over the past six decades. I have presented both the scientific achievements and the personal connections which resulted from these collaborations. Finally, I document my own German heritage from the family ownership of the beer brewery in the 18th century to my inheritance of the Liebermann family Bible. I would like to dedicate this paper to Ingrid and Johannes Voigt, our friends from Marbach whom we first met in Australia in 1970.

Acknowledgements

I am grateful to Tiziana Boffa-Ballaran, Tom Duffy, Lars Ehm, Dan Frost, Steve Jacobsen, Stefan Klotz, Alfreda Liebermann (my cousin), Hans-Joachim Mueller, Jean-Paul Poirier, Dave Rubie, Hartmut Spetzler and Sharon Webb for their correspondence and contributions to this historical paper. My collaborations with these “German” colleagues have been supported by research grants from the NSF Geophysics Program and the NSF Science and Technology Center for High Pressure Research [CHiPR]. This report was written with support from a research grant to Baosheng Li and myself from the National Science Foundation (EAR-1524078).

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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