CHEMICAL HERITAGE FOUNDATION

PETER F. DECARLO

Transcript of an Interview
Conducted by
Hilary Domush and Jody A. Roberts

at
Drexel University
Philadelphia, Pennsylvania

on
10 and 11 April 2013

(With Subsequent Corrections and Additions)
CHEMICAL HERITAGE FOUNDATION
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PETER F. DECARLO

1979  Born in West Lafayette, Indiana, on 25 March

Education

2001  BS, *cum laude*, University of Notre Dame, Biochemistry
2007  PhD, University of Colorado, Atmospheric Science

Professional Experience

2008-2010  Paul Scherrer Institute, Switzerland
            Postdoctoral Researcher

2010-2011  American Association for the Advancement of Science, Washington, DC
            Science and Technology Policy Fellow hosted at US EPA

2011-present  Drexel University, Philadelphia, PA
              Assistant Professor, Department of Civil, Architectural, and
              Environmental Engineering

2012-present  Assistant Professor, Department of Chemistry

Honors

1997  Bausch and Lomb Honorary Science Award
2002  University of Colorado Program in Atmospheric and Oceanic Sciences Fellowship
2005-2007  EPA STAR Graduate Research Fellowship
2007  Atmospheric Chemistry Colloquium for Emerging Senior Scientists (ACCESS) IX participant
2008-2010  NSF International Research Postdoctoral Fellowship
2009  Sheldon K. Friedlander Award for Outstanding Doctoral Dissertation from American Association for Aerosol Research
2010-2011  AAAS Science Policy Fellowship
Peter DeCarlo grew up in West Lafayette, Indiana, the second of three children. His father is a professor of electrical engineering at Purdue University, and his mother is a kindergarten teacher. Both sisters also have advanced degrees. DeCarlo attended West Lafayette’s excellent public schools which offered high school students joint classes with Purdue. He loved chemistry, first becoming interested in pharmaceutical chemistry, which led to a major in biochemistry at the University of Notre Dame, where he received a top-notch undergraduate education. Paul Hallquist, a teacher and mentor, recommended a summer internship at American Cyanamid Company where DeCarlo learned mass spectrometry. After graduation he spent a year in Kenya, during which time he was admitted to the University of Colorado’s atmospheric and oceanic sciences department. There he joined Jose-Luis Jimenez’s research group and participated in his first field project, MCMA-2003 (Mexico City Metropolitan Area), in Mexico, learning the theory, design, and use of the aerosol mass spectrometer (AMS), and enjoying the excitement and the stress of field work. DeCarlo’s next project was in Canada, researching the transport of pollution around the world. He then returned to Mexico for MILAGRO (Megacity Initiative: Local and Global Research Observations), a large project requiring extensive cooperation, collaboration, and coordination.

Having completed the requirements for his PhD, DeCarlo accepted a postdoctoral award from the National Science Foundation to work on chamber studies at the Paul Scherrer Institute in Switzerland. During this time, he also did fieldwork in Spain, France, and Switzerland. Wishing to return to the United States and having become interested in science policy, DeCarlo accepted a fellowship from the American Association for the Advancement of Science, working in the US Environmental Protection Agency. He met his future wife during this time. Eager to return to scientific research, he accepted an assistant professorship at Drexel University in Philadelphia, Pennsylvania.

DeCarlo’s research plans include characterizing and developing the mini AMS made by Aerodyne Research, Inc. He remains involved in the Global Alliance for Clean Cookstoves as such stoves, which are widely used around the world, burn solid fuel and produce black carbon. Aerodyne has produced a new soot particle AMS which DeCarlo uses for his black carbon work. He has begun to do atmospheric research on the Marcellus Shale in Pennsylvania and compares the gains from and costs of natural gas and coal. His students’ projects include a study of indoor-outdoor pollution, a study of indoor air quality, and black carbon research.

DeCarlo discusses the difficulties inherent in large atmosphere studies, including differences in approaches and data reporting, as well as cultural and temporal differences. He finds his relatively small branch of the MS community collaborative and friendly. He wants to improve the visual representation of science data as a way to increase people’s enthusiasm for and understanding of his work. He laments the lack of sufficient funding for science in general and for new satellites and long-term field studies in particular, and decries science illiteracy, especially among policy makers. He talks about the possibility of instruments for ordinary citizens and emphasizes that atmospheric science is not meteorology.
Early Years
Growing up in West Lafayette, Indiana, as one of three children. Family members’ backgrounds, education. Public schools very good, associated with Purdue University; good teachers, intelligent students. Senior year of high school classes at Purdue. Loved chemistry, sports. Cultural and intellectual stimulation in university town. Bought pharmaceutical book; interest in pharmaceutical chemistry led to biochemistry in college.

College Years
Choosing University of Notre Dame over Purdue. Family, including father, attended Notre Dame; mother went to St. Mary’s. Very good undergraduate education; good professors. Philosophy and art classes; interested in giving science more visual appeal. Paul Hallquist and internship at American Cyanamid Company after freshman year. Learned mass spectrometry there. Always knew he would go to graduate school. Summer volunteer work. Semester abroad in London, England. Year in Kenya after graduation. Interested in computational chemistry; applied to atmosphere and physical chemistry programs under J. Daniel Gezelter’s influence.

Graduate School Years
University of Colorado center of atmosphere study with advisor Jose L. Jimenez. Mexico City Metropolitan Area (MCMA) project to work on aerosol mass spectrometer (AMS). Excitement and stress of field work. Accustoming himself to instruments; writing new software. Summer project in Canada on pollution movement around world. Working in field with time of flight MS; advantages of AMS. Second project in Mexico in 2006, MILAGRO (Megacity Initiative: Local and Global Research Observations). Logistics of flying; massive coordination. Writing algorithms for analysis of data, writing papers, sharing data. Collaborative field, still small. PhD usually finished after three papers.

Postdoctoral Work
National Science Foundation (NSF) postdoc award at Paul Scherrer Institute in Switzerland; Chamber studies to simulate diesel pollution in atmosphere. Collaborations; fieldwork. Barcelona, Spain experiment. International, multidisciplinary collaboration. General applications of knowledge gained from his research. Return to US for American Association for the Advancement of Science fellowship in Office of the Science Advisor, Paul Anastas, at the Environmental Protection Agency. Thoughts about science and policy. Involved in Global Alliance for Clean Cookstoves (GACC), black carbon research. Wish to return to research. Met future wife, began looking for academic job.
First Independent Laboratory
   Two-body problem; wife already established at Drexel University.
Characterizing and developing Aerodyne’s new mini AMS and continuing
cookstove research. Hopes to extend work on Marcellus Shale. Comparison of
natural gas to coal. Much of Marcellus research focused on water; air quality
studies by Carnegie Mellon, Purdue, Aerodyne, Electric Power Research
Institute. Students’ projects: characterization of mini AMS; outdoor-indoor
pollution around switching inlets; indoor air quality (joint project with Michael
Waring); black carbon work. New Aerodyne soot particle AMS to measure black
carbon. Local partners in Philadelphia. Desire to do large field studies. Annual
conference hosted by Aerodyne. Field small and friendly; Aerodyne
accommodating.

General Thoughts
   Improving visual representations of data. Short-term effects versus long-term
effects. Costs and funding of long-term field experiments. Need for new
satellites. Science literacy in policy making. Impact of citizens on policy. Need to
excite enthusiasm for science in lay people. Possibility of instruments for
ordinary citizens. Atmospheric science is not meteorology.

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