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When a diatomist meets a physicist – timeline of a scientific friendship

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Abstract: This scientific greeting aims to thank Richard (Dick) Crawford for his scientific and personal friendship with the author, an experimental physicist, and show fellow scientists the beauty of scientific friendship across fields of specialization. It outlines important dates of their scientific encounters, and connects them to joint scientific publications.

Keywords: diatoms, tribology, *Ellerbeckia*, living diatoms, physics, phycology

Rather than a scientific paper this is a scientific greeting to Dick Crawford, the fabulous diatomist, from a scientist friend working in physics engineering, specifically in the fields of tribology, nanotechnology and biomimetics.

I still remember my first encounter with Dick Crawford. Having read some of his papers, I wrote an email to him. This was early in 2003. We started communicating about our science and interests, and in November 2003, we finally met: he invited me to the Alfred Wegener Institute in Bremerhaven, to give a talk on the work I had done on live diatoms during my postdoctoral research in Paul Hansma's laboratory in the Physics Department of the University of California in Santa Barbara in 1999. The title of my talk was "AFM of living diatoms in ambient conditions": AFM is the abbreviation of atomic force microscopy, a then relatively new and now highly established microscopy method that allows for the ultrahigh resolution imaging of live cells in fluids – which is of course perfect for benthic diatoms. Dick Crawford and myself soon found out that our interests when it comes to diatoms and nanotechnology overlap quite a bit.

My first encounter with diatoms had been when I was still in school and our biology teacher Professor Zenkl showed us images of amazingly beautiful single-celled organisms – diatoms. I think he used the drawings by Ernst Haeckl to introduce us to this new world. Organisms have always fascinated me: plants, animals, microorganisms, humans. However, the single-celled ones are the most marvellous creatures I know. Then, for quite some time I did not encounter any single-celled organisms in my studies or in my work. I was studying physics engineering and wrote my diploma and PhD thesis on the inner ear.

The world of these single-celled beauties came back to me in full impetus when I did my postdoctoral research at the Physics Department of the University of California in Santa Barbara. There my task was to investigate living diatoms with the atomic force microscope.

Back in Europe I started my academic career at the Vienna University of Technology. One point in time my love for diatoms resurfaced – and this was when I met Dick Crawford. The second time we met was also in Bremerhaven – this time I was joined by Dr. Manfred Drack, now theoretical biologist in Tübingen in Germany, and we met Dick Crawford and fellow diatomist (amongst many other fields) Richard (Dick) Gordon. Also, in this respect I am thankful to Dick Crawford: My friendship with Dick Gordon was established there in Bremerhaven back then in 2004, and it still holds, and is scientifically fruitful: we have published various papers and book chapters together and are currently writing a chapter on diatom triboacoustics, i.e., the sounds that are emitted by moving diatoms.

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