



## Personal Memories of Professor Thomas Hartmann, Chemical Ecologist in Heart and Soul

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We both had the privilege of establishing a close relationship with Thomas Hartmann albeit in different contexts: Nelida during and after her PhD in Braunschweig 1993–1997) and after (until 2002) working on chemical ecology of Cassidinae larvae, and Jacques during a long collaboration on the sequestration of pyrrolizidine alkaloids (PAs) in alpine and neotropical leaf beetles.

Jacques: “When we first observed in 1987 that some leaf beetles incorporate PAs in their defensive secretion (Pasteels and others 1988), we immediately contacted the world-expert on plant PAs, Thomas Hartmann, nicknamed “Mister PAs” for his renowned expertise. Thomas immediately perceived the potential of our beetle model, as their sequestration capacity can easily be checked by collecting their secretion without killing them. Our collaboration lasted 15 years without interruption leading to 13 research papers and two review papers.

Working with Thomas was a great scientific adventure. He was a brilliant biochemist, organized, and rigorous. He always raised the right questions and planned the experiments solving them without any ambiguity. Without him we would not have deciphered the complex mechanisms involved in sequestration, which totally differ in alpine and neotropical beetles. He was a highly enthusiastic researcher and it was fantastic to collaborate with him. Thomas used to say that the frequent parallel evolutions of sequestration of PAs by beetles, moths, bugs are clear evidence that they were selected for defense. The best evidence for that was being provided by

one of our alpine beetles in which autogenous cardenolides were replaced in their defensive glands by sequestered PAs with increased protection at least against birds (Pasteels and others 1995). He was fascinated by the, among insects, unique capacity of beetles to partially synthesize complex plant secondary compounds: cardenolides are synthesized from cholesterol and from phytosterols, mainly in Palearctic beetles. Original “insect triterpene saponins” are synthesized from plant derived beta-amyrine. In addition, he was fascinated by the hemi-synthesis of original “insect PAs” from plant derived retronecine in neotropical beetles (Hartmann and others 2001). Of all these findings were clearly demonstrating that PAs in beetles secretions cannot be just a detoxification mechanism.

Of course, Thomas’ interests were not limited to the mechanistic aspects of sequestration. He was fascinated by the biological significance of the extraordinary diversity of plant secondary metabolites, comprising more than 200.000 structures. Among those his research was mainly focused on PAs, their structures, distribution among and within plants, biosynthetic pathways, as well as their function and hence their evolution (Hartmann 1996). This was Chemical Ecology at its best.

Thomas Hartmann was also very interested in the history of evolutionary concepts regarding plant secondary metabolism and published two papers that all chemical ecologists should read: “From waste products to ecochemicals: Fifty years research of plant secondary metabolism” (Hartmann 2007) and “The lost origin of chemical ecology in the late nineteenth century” (Hartmann 2008). The second paper was based on a magnificent lecture he gave during the 2007 ISCE meeting in Jena. Early visionaries mentioned in the paper were Ernst Stahl, Professor at the University of Jena, and Leo Errera, at the Université libre de Bruxelles. We had animate discussions while evoking the originality and creativity of these scientists proposing concepts well in advance of the orthodox ideas of their time.

Thomas Hartmann was a great naturalist. Walking in the Harz with him was an unforgettable experience. In 1988 we had only access to the West part of the Harz National Park that

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we reached by driving along the wall that divided Germany at the time (a chilling view). It was a most pleasant and interesting day. Thomas knew all flowers pointing out the most unique or beautiful plants of the Harz. In return, we pointed out leaf beetles related to the alpine beetles, the objects of our experiments. With obvious nostalgia, he told us that the East Part of the Harz is far more impressive. He had vivid memories of the excursions he made there 30 years ago before the wall was built, adding that, very sadly, the East Harz will remain out of reach for us, most likely forever. Two years later, we crossed the fallen wall to enter the East Harz. It was an emotional experience. The scenery was spectacular. We entered the land of German mythology haunted by Wodan and Brunhilde, the land that inspired Goethe who explored it in all its wildness. There you could fully grasp German Romanticism. Our 15 years of collaboration generated a friendship that never faded.”

Thomas Hartmann was always ready to share his eclectic interests and expertise opening new horizons to students, colleagues and friends. This was the case of Nelida who met him on a rainy morning of July 1993. Nelida: “Despite being cold and rainy in Braunschweig, the warmth and friendliness of Prof. Hartmann made me feel comfortable and welcome. This is how he was in general. In the lab, he would often make jokes, and I need to say that sometimes we would wonder what he meant, especially non-German speakers. Anyhow, his enthusiasm was so contagious that we would laugh anyway.

Prof. Hartmann loved outdoors activities. In the summer time in Germany, we would go to field trips by bike to enjoy nature, share food and jokes, and held cookouts outside the institute’s greenhouse. We all still hold great memories of those trips, along with many photos. And in wintertime, we would hide from the cold in the greenhouse, which he supported and developed as an integral part of our research projects. Our garden was designed to display a comprehensive collection of medicinal plants, and visited often times by students, teachers and the general public. Prof. Hartmann made sure that the garden was properly supported to comply with its outreach and research missions.

His particular interest in chrysomelids and pyrrolizidine alkaloids meant that most of his doctorate students carried out research projects related to this topic, excepting mine. Despite arriving in Braunschweig with a non-alkaloid system of chrysomelids and their host plants, Prof. Hartmann was very supportive of my research to the point he himself went on a field trip to Panama right after he recovered from chemotherapy. We published our first paper on the ecology of the Cassidinae larvae in 1999 (Gomez and others 1999). Years

later, at the Max-Planck for Chemical Ecology, with Wilhem Boland, we studied whether the construction of the cassidine larval shields may imply an enzyme-driven polymerization process. We are still puzzled by the ability of the cassidine larvae to build and chemically weaponize their fecal shields, not only from the ecological view, but also, from the evolutionary perspective. We know very little about the larval adaptations over time that led to the manipulation of their body wastes in sophisticated shapes and textures.

From the trip to Panama, I recall with special regard an early Sunday morning when we went to look for chrysomelids. Instead, we ran into a black snake sunning itself next to the bushes. We both jumped, scared, and ready to run, but the snake was even more scared and rushed away rapidly. Thomas Hartmann would laugh so much about our snake encounter, and the size of the snake had increased from a meter to several meters when we reached Germany a week later. His sense of humor was well known among students and colleagues.”

Prof. Hartmann was not an extravagant extravert. He was more reserved, but very social during less formal gatherings with a nice sense of humor. He had warm personality, gentle, joyful, inspiring, always approaching others in a very respectful, very friendly, open-minded way. Prof. Hartmann’s scientific legacy still stands over long periods. We will never forget Thomas Hartmann, the scientist and the man.

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