

From Social Geochemistry to the planetary scale: an impressionist tribute to Annette Johnson

L. CHARLET¹

¹ISterre, University of Grenoble Alpes, CS 40700, 38058 Grenoble, France

Annette was a shining star in the rather serious, though intellectually brilliant, Swiss-German world of geochemistry. Her laugh is still imprinted in the EAWAG corridors.

When I first met her, Annette was doing precursor work on what is now known as « Material Life Cycle Analysis » (then « industrial metabolism ») in the group of P. Baccini quantifying fluxes of heavy metals in a society, as W.M. Stigliani (IIASA, Austria) on the large transboundary watershed level. Instead of working on (nice) natural ecosystems, she engaged in (weird) studies on waste and concrete [1], asking e.g. whether waste combustion products containing toxics should be « buried » in concrete.

Annette then shifted her focus to what she really liked, i.e. Social Geochemistry, where science meets with people. While I was leading large field work on Hg in tropical forest and As in SE Asia, she went to Ethiopia to work on excess F that affects millions in the Rift Valley (leading to teeth and bone disorders) and to develop community-based F-removal technologies for rural villages [2]. We planned to organize a second meeting for the Journal of Hydrology in Ethiopia together, but alas this never happened.

While I was diving down to the nanoscale, Annette scaled up to map the risk of As and F exposure at the continental level [3, 4], beginning her collaboration with our symposium leader L. Winkel. With a keen knowledge of the chemistry of oxyanions such as Sb or As, Annette took the risk of extrapolating (« modeling ») the existing patchy data on the basis of widely available soil or geology data. Only Annette could take on such a challenge. While already fighting the cancer that was slowly eating her from inside, she worked and danced the flamenco till the end, punctuating all her discussions with her trademark « !Lovely! ». Geri Furrer, her long-time friend and former husband (« la vie n'est pas un long fleuve tranquille » given their contrasted characters) dispersed her ashes (the oldest geochemical concept!) in the Scotland Highlands she loved so much.

[1] Baur and Johnson (2003) *Environ. Sci. Technol.* **37**, 3442-3447. [2] Mulugeta et al. (2015) *Water SA* **41**, 121-128. [3] Amini *et al.* (2008) *Environ. Sci. Technol.* **42**, 3669-3675. [4] Amini *et al.* (2008) *Environ. Sci. Technol.* **42**, 3662-3668. [5] Bretzler and Johnson (2015) *Appl. Geochem.* **63**, 642-646.