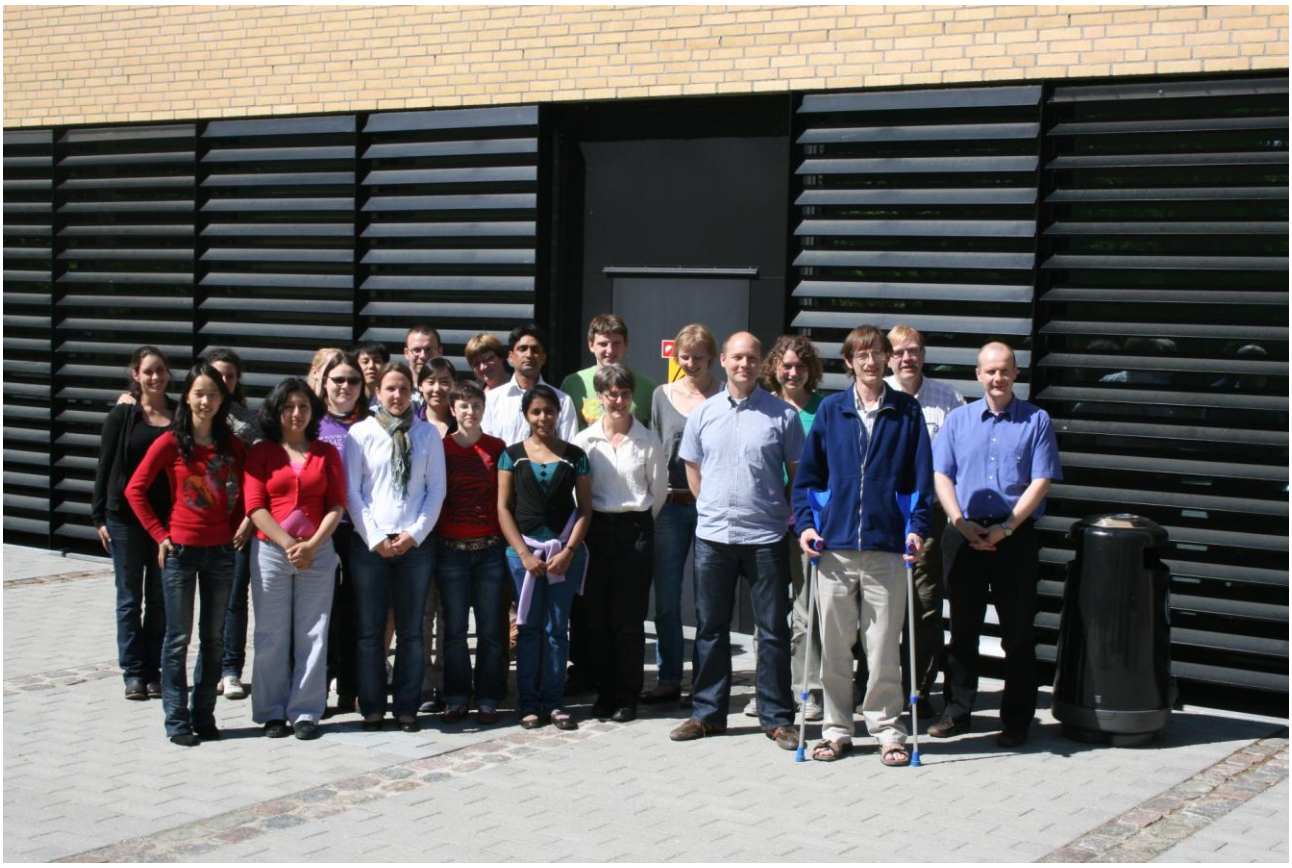
Report on activities during the FIMIN workshop in Copenhagen 26th of May to 8th of June 2010:

MAGNETIC METHODS IN BIOGEOCHEMISTRY-

From field to microscopy and Mössbauer spectroscopy



Outside the CEN microscopy facility, DTU

15 students participated in the workshop following application (names and affiliation are attached separately).

Teaching was given at University of Copenhagen (LIFE Campus), Technical University of Denmark (Lyngby), Lund University, one day of field trip on Zealand, and one day was off. Lodging was arranged at the hostel in central Copenhagen and transport via bus and S-train, excursion in cars from University of Copenhagen, and train to Lund.

Breakfasts and lunches were mostly arranged for the whole group at the university whereas supper was in small groups in town. A garden party was held on the 5th of June (Constitutional Day) at the home of C. Bender Koch.

Profs. Posfai and Dunin-Burkowski and Bender Koch met in 25th and 26th of April at CEN, DTU for the planning of activities during the workshop days at CEN.

Major subjects and main responsible teacher were:

Microbial Geochemistry of iron in the field (Prof. Bo Thamdrup, SDU)

Mössbauer spectroscopy (Prof. C. Bender Koch, UC)

Microscopy (Prof. M . Posfai, Vesprem and Prof. R. Dunin-Burkowski, DTU)

Environmental Magnetism (Prof. A. Hirt, ETH and Prof. I. Snowball, Lund)

Prof . C. Bender Koch participated all days and coordinating logistics and Prof. A. Hirt also participated in the Microscopy session.

Overview of activities:

26-30th at KU-LIFE:

The 26th: Arrival and introduction of participants and their projects. Exchange of contact information. Logistics.

The 27th: Field trip to Lejre Creek with Prof Bo Thamdrup, demonstrations of sampling and field characterization methods

The 28th to 30th: Mössbauer spectroscopy – theory, and theoretical and practical exercises by C. Bender Koch

The 31st to 4th at CEN, DTU:

SEM and TEM: theory (mostly morning sessions) and practical exercises (mostly afternoon sessions)

With contributions by:

Prof Andy Horsewell on Electron- matter interactions

Prof Chris Boothroyd on 1) SEM and TEM basics and 2) HRTEM and STEM and 3) Microanalysis in SEM and TEM

Prof Mihail Posfai on Diffractogram analysis

Prof. Rafal Dunin-Borkowski on Advanced TEM methods including electron holography and tomography

Sen. Scientist Thomas Villum Hansen on ETEM - introduction and discussion

Ph.D. student Louise Soegaard Jensen on Electron microscopy on soft and biological material

Additional CEN staff contributing at the practical exercises:

Drs. Takeshi Kasama, Ramona Mateiu, Andras Kovacs, and Nicole McDonald and Berit Wenzell. Ramona Mateiu coordinated the use of the seven microscopes at CEN.

The 6th and 7th at KU-LIFE:

Environmental magnetism – theory and exercises by Prof. Ann Hirt

The 8th at Lund University:

Visit to the Paleomagnetic Laboratory by Prof Ian Snowball with presentations by Prof Ian Snowball and 2 Ph.D. students. Most participants returning home late afternoon from Copenhagen, - 1 stayed 2 days longer to work in the laboratory at LIFE.

Measurements of samples brought by the students were conducted parallel to the classes and discussed as additional examples. Because of the high numbers of samples brought for Mossbauer analysis by the students I decided to redistribute the funds for experiments and continue measurements parallel with the SEM and TEM work.

Running costs of students' samples for SEM, TEM and Mössbauer spectroscopy was partially supported by the workshop.

The total cost of the workshop is smaller than budgeted in part because Prof Posfai stayed in a private accommodation both during the workshop and preparatory meeting in April.

I am thankful for all the help received and time given by colleagues contributing to the workshop and grateful for the enthusiasm from the students.

Chr. Bender Koch

Copenhagen July 2010