



Société Française de Minéralogie et de Cristallographie

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MINUTES OF THE SFMC EXCURSION ON 22 AND 23 MAY 2023, LES SABLES D'OLONNE (FRANCE)

The excursion proposed to the SFMC by Daniel Beaufort and Paul Sardini, lecturers at the University of Poitiers, took place on the Vendée coast, between Brétignolles-sur-Mer and Port Bourgenay on 22 and 23 May. The trip focused on a visit to the Sables d'Olonne metamorphic series. This group of rocks has long been a magnet for geologists, and is visited every year by field schools from many secondary schools and universities. The outcrops are easily accessible and of very high quality. The rocks outcrop almost continuously from Sauveterre beach in the north to Port Bourgenay in the south, and are constantly refreshed and polished by the action of the ocean. However, it is first and foremost the exceptional variety of rocks arranged along a Barrowian gradient, containing easily observable index minerals and varied ductile and fragile structures, that make it a site of national interest.

The participants came from a wide range of backgrounds: six senior lecturers who had come to recharge their batteries, three research lecturers who were not yet senior lecturers, five secondary school lecturers in search of new discoveries, and two PhD students keen to extend their knowledge of the field. This group made for a dynamic outing, powered by an open atmosphere in which every question took time to be discussed. Discussions were guided by field observations, photographs of thin sections, and chemical analyses (bulk rock and minerals) recently acquired by the organisers. The outcrops were discussed without prejudice, giving way first to the questions raised by the field observations, then to the interpretative debates. The organisers took the time to create a convivial atmosphere, particularly during lunch and dinner, and during a pleasant aperitif at the remarkable Sauzaie porphyry outcrops to the north of Brétignolles-sur-Mer Monday evening.



FIGURE 1 Ductile shear on a chloritoid porphyroblast.

The first day was devoted to the outcrops of the northern section, with visits to Sauveterre, Girvière (north of Grands Chevaux), Anse de Chaillé, and La Chaume (around Fort Saint Nicolas). We finished with a short visit to the para-autochthonous / porphyroids contact at Brétignolles. The first day's outing began with a visit to Sauveterre, where the emphasis was on the differences in lithology, mineralogy, and deformation of the schistose rocks between the cliff and the foreshore, due to a fault with a horizontal displacement of several hundred meters. Observation of rocks in outcrop, supplemented by microscopic observations of thin sections, has enabled us to visualise the petrographic

relationships between the main metamorphic minerals (muscovite, chlorite, ilmenite, biotite, garnet, chloritoid, and staurolite) in all the rocks in the Sauveterre sector. These rocks are devoid of feldspar, unlike the staurolite, kyanite, and/or sillimanite micaschists found further south (Girvière sector). The ductile EW shear flowing towards the W was well observed, particularly on the chloritoid crystals (FIG. 1).

Another highlight was Hugo's discovery of a garnet megacrystal (FIG. 2). This dark red garnet survived the mechanical abrasion that turned it into a pebble. Its unusual size (around 6 cm in diameter) and its chemical composition, which was subsequently analysed, raise questions about its origin. The analysis revealed a composition enriched in pyrope compared to all garnets in the Sables d'Olonne series, which are smaller in size (between <1 mm and 1–2 cm) and whose composition is dominated by the almandine and spessartine poles. Another highlight of the first day was the observation at La Chaume of subhorizontal ductile shear zones very rich in biotite (biotitite), and their relationship with the migmatitisation of the gneisses. The fact that the chemical composition of the biotite in the biotitites is identical to that of the biotite in the gneisses with little or no migmatitisation suggests that the biotites observed in the migmatites subjected to strong shear are restites.



FIGURE 2 Garnet megacrystal (6 cm).

The second day was devoted to the outcrops to the south of the town of Les Sables (southern section). We began our visit at Pointe de Péruse, followed by Puits d'Enfer, Anse aux Moines, Bois Saint-Jean (near the Bunker), and Anse de Cayola.

We ended the tour at La Salle au Roy, to the north of the mine. The petrological, mineralogical, and structural characteristics of the metamorphic rocks in the southern section are consistent with a succession of at least three major structural compartments, each of whose rocks bears a strong resemblance to those in different parts of the northern section. The visit to the Puits d'Enfer was perhaps the most memorable of the day, as it revealed the relationships between the granite, migmatites, gneiss, and biotitites. The contact between the migmatites and the granite is marked by the presence of numerous clusters of healthy garnets, systematically located in leucosomes. This enabled us to draw up an original synthetic cross-section of the Puits d'Enfer outcrops

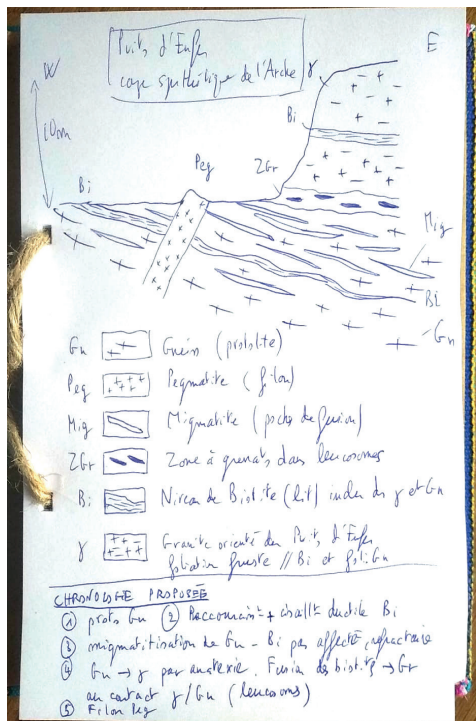


FIGURE 3 Synthetic cross-section of the Puits d'Enfer outcrops

(FIG. 3). The visit to Anse de Cayola was also rich in observations. In addition to the kyanite and sillimanite found in gneisses rich in fusion pockets, an outcrop in this sector cuts across the unconformity between the metamorphic basement and the limestones of the Lias, with some very fine figures of injection of sedimentary material into the foliation plane of the altered gneiss (see FIG. 4, with the whole group).



FIGURE 4 Participants (LEFT TO RIGHT): Philippe Vieillard, Didier Zany, Benjamin Rondeau**, Christian Chopin, Nicole Barot, Michel Faure, Olivier Jaffrezic, Jean-Marc Benoit, Michel Pichavant, Paul Sardini*, Daniel Beaufort*, Sophie Billon, Hervé Diot, Flora Parrotin, Hugo Lefeuvre. PHOTO: MAXIME HUILLE.

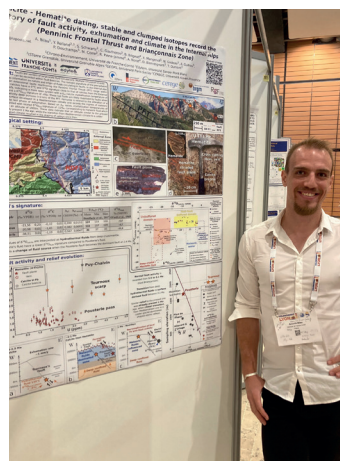
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Paul Sardini, Daniel Beaufort, and Benjamin Rondeau

SFMC SCHOLARSHIP LAUREATES FOR THE GOLDSCHMIDT CONFERENCE, LYON • 10-14 JULY 2023

The French Society of Mineralogy and Crystallography committee attributed three scholarships to:

Chloé Boutillez (Université Gustave Eiffel / Laboratoire Géomatériaux et Environnement LGE). She presented her work entitled, 'Alteration of stained glass windows: influence of the Mn-oxidising bacteria *Pseudomonas putida* on the dissolution of 5 model glasses'.



Antonin Bilau (Université de Franche-Comté). He presented his study entitled, 'Calcite - Hematite dating, stable and clumped isotopes record the history of fault activity, exhumation and climate in the internal Alps (Penninic Frontal Thrust and Briançonnais zone)'.

Quentin Bollaert (Sorbonne Université, Institut de Minéralogie, de Physique des Matériaux et de Cosmochimie IMPMC). He presented a poster entitled, 'Weathering of natural pyrochlore during hydrothermal and supergene alteration'.

