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Technique development and validation of experimental paleochemotaxonomy. Future implications for paleofloral and paleoclimatic reconstructions.

Y. Hautevelle (1), R. Michels (1), F. Lannuzel (1), B. Farre (2), F. Malartre (2), A. Trouiller (3)

(1) UMR 7566 CNRS G2R, University Henri Poincaré, Nancy 1, BP 239, 54506 Vandoeuvre-les-Nancy cedex, France, (2) UMR 7566 CNRS G2R, Ecole Nationale Supérieure de Géologie, BP 40, 54501 Vandoeuvre-lès-Nancy cedex, France, (3) ANDRA, 1-7 rue Jean Monnet, 92268 Châtenay-Malabry, France (Yann.Hautevelle@g2r.uhp-nancy.fr)

Vascular plant biomarkers preserved in sedimentary archives are molecular fossils originating from the diagenesis of biomolecules synthesized by terrestrial plants living at the time of deposition. Some have a paleochemotaxonomic value, meaning that they are specific of a restricted number of plant taxa, and are thus excellent geochemical proxies of ancient flora and of their associated paleoclimates. However, many gaps in our knowledge on paleochemotaxonomy considerably limit the interpretation of plant biomarkers assemblages in terms of paleoflora composition.

In order to fill these gaps, we developed an original approach based on artificial maturation of extant plants by confined pyrolysis. The objective is to calibrate the pyrolysis parameters in a such way that the widest range of molecular plant biomarkers classically found in the geosphere is produced during the laboratory experiment.

A representative of *Pinaceae* (*Abies pinsapo*) was chosen for the calibration of our technique since *Pinaceae* contain large amounts of abietanoic acids of which the diagenetic pathway is well-known. The pyrolysis was carried out during 24h under 700 bar at various temperatures. At 280˚C, all the aromatic abietanes commonly found in sediments and rocks are produced from abietanoic acids. Saturated abietanes, which are also widespread in the geosphere, are generated by the pyrolysis of the plant mixed with a reducive agent. The distributions of the aromatic and saturated plant biomarkers obtained after pyrolysis are typical of the fossil *Pinaceae*.

Therefore, this validated procedure allows to predict the molecular signature of fossil relatives from pyrolysed plants. Its application to other plant taxa will greatly increase our knowledge on botanical paleochemotaxonomy and will significantly enlarge our capacity of paleofloral and paleoclimatic reconstructions using plant biomarkers.