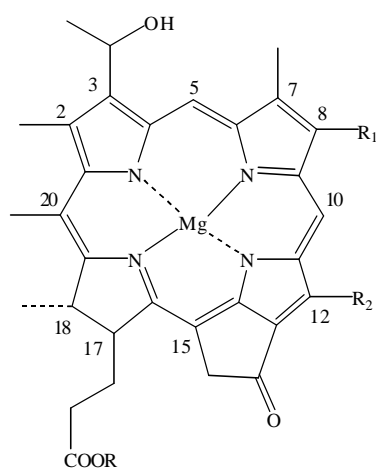


ARE BACTERIOPHEOPHORBIDES C 7-DEMETHYL-7-ACETONYL FOSSILS OF A NEW BACTERIOCHLOROPHYLL SERIES?

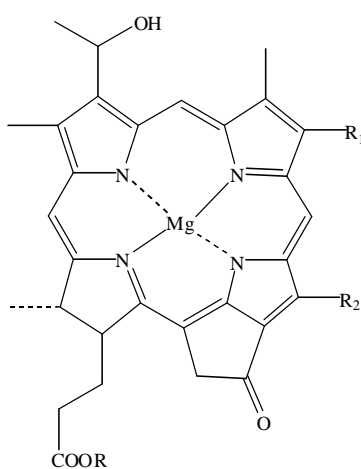
Raymonde BALTENWECK-GUYOT and Rubén OCAMPO-TORRES

Laboratoire de Géochimie Bioorganique, UMR 7177 (CNRS-ULP), ECPM, 25, rue Becquerel, 67200 Strasbourg, France.

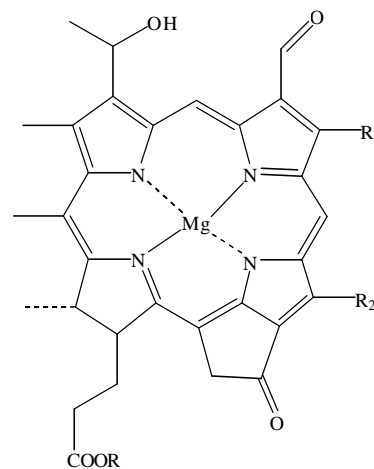
Photosynthetic sulphur bacteria live in a part of the anoxic layer of stratified water bodies (ponds, lakes and estuarine habitats) located in the photic zone. The complex group of photosynthetic pigments present in brown, green and red sulphur bacteria is bacteriochlorophylls *c*, *d* and *e* and was first called *Chlorobium* chlorophylls. These pigments have a common number of structural features and present some structural differences compared to other chlorophylls and bacteriochlorophylls. They are chlorins, they lack the 13²-carbomethoxy group, they bear an α -hydroxyethyl substituent at position C-3, and probably the most important, at least for organic geochemists, they may bear extended alkyl groups at positions C-8, C-12 and for bacteriochlorophylls *c* and *e* a methyl group at position C-20. These alkyl groups are very resistant through diagenetic transformations and are still present in some porphyrins isolated from geological samples. Geological pigments bearing such as alkyl groups at positions C-8, C-12 and C-20 are biological markers of photosynthetic sulphur bacteria and are used for paleoenvironmental reconstructions. Here we report the presence of several novel bacteriopheophorbides series isolated from a coastal salt pond sediment (Salt Pond, MA, U.S.A.). Two pigments series (bacteriopheophorbides and methylbacteriopheophorbides), isolated from this sediment, present the same carbon framework than bacteriopheophorbides *c* but bear an acetyl group at the C-7 position. These series were studied by RP-18 HPLC, UV-Vis, SM and LC-MS (APPI mode) and the structure determination of some of their members were obtained by ¹H NMR. They may be fossils of an unknown photosynthetic bacteriochlorophyll series even if an origin from water column or postsedimentary transformations can not be excluded. Some of them can be intermediates on the formation of porphyrins already isolated from sedimentary organic matter.

**Bacteriochlorophylls c**

R = Farmesylyl

R₁ = Et, *n*-Propyl, *i*-Bu, neopentylR₂ = Me, Et**Bacteriochlorophylls d**

R = Farmesylyl

R₁ = Et, *n*-Propyl, *i*-Bu, neopentylR₂ = Me, Et**Bacteriochlorophylls e**

R = Farmesylyl

R₁ = Et, *n*-Propyl, *i*-Bu, neopentylR₂ = Me, Et

REFERENCES

- Keely, B.J., Maxwell, J.R., 1993. The Mulhouse basin: evidence from porphyrin distributions for water column anoxia during deposition of marls. *Organic Geochemistry* 20, 1217-1225.
- Ocampo Torres, R., 1985. Porphyrines dans le schiste de Messel : Etude structurale et signification géochimique. Ph D. Thesis, Université Louis Pasteur de Strasbourg.
- Ocampo, R., Callot, H.J., Albrecht, P., 1985. Occurrence of bacterioporphyrins in oil shale. *Journal of the Chemical Society Chemical Communications* 1985, 200-201.
- Ocampo, R., Callot, H.J., Albrecht, P., 1987. Evidence for polar porphyrins of bacterial and algal origin in oil shale. In: *Metal Complexes in Fossil Fuels*, Filby, R.H., Branthaver, J.F. (Eds.), pp. 68-73, ACS Symposium Series 344, Washington.
- Ocampo, R., Bauder, C., Callot, H.J., Albrecht, P., 1992. Porphyrins from Messel oil shale (Eocene, Germany): Structure elucidation, geochemical and biological significance, and distribution as a function of depth. *Geochimica et Cosmochimica Acta* 56, 745-761.
- Scheer, H., 1991. Chemistry of chlorophylls. In: Scheer, H. (Ed.), *The Chlorophylls*, pp. 3-30. CRC Press.
- Wilson, M.A., Hodgson, D.A., Keely, B.J., 2004. Structural variations in derivatives of bacteriochlorophylls of Chlorobiaceae: impact of stratigraphic resolution on depth profiles as revealed by methanolysis. *Organic Geochemistry* 35, 1299-1307.