OSTRACODES, ROCK FACIES AND MAGNETIC SUSCEPTIBILITY OF THE TROIS-FONTAINES / TERRES D'HAURS TRANSITION IN THE TYPE LOCALITY FOR THE GIVETIAN

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The Rancennes quarry is located 1 km south of Givet, at the Mont d'Haur, and along the western rampart of an entrenched camp built in the end of the XVII century by VAUBAN, the military architect of LOUIS XIV. The series exposed in the quarry is particularly homogeneous and consist of 46 m of well bedded fine-grained greyish mudstones, wackestones and laminites (= Trois-Fontaines Fm, base of the Givetian Group) overlain by 14 m of thicker beds of clayey slightly nodular wackestones, packstones and floatstones with crinoids, corals and various shelly bioclastic (= Terres d'Haur Fm). The base of the Terres d'Haur Fm is marked by a clayey nodular biostrome. The Rancennes quarry completes the stratotype of the Terres d'Haur Fm located on the southeastern flank of the entrenched camp of the Mont d'Haur where the Trois-Fontaines Fm / Terres d'Haur Fm boundary is not visible.

Lithological column of the Rancennes quarry: (A) stratigraphy; (B) thickness; (C) lithology; (D) position of ostracode samples; (E) position of samples for thin section and MS analysis.

Ostracodes

1,200 ostracodes were extracted by the hot acetylation method from 64 samples collected in the Rancennes quarry, and 49 species were recognized. The richness and diversity of ostracodes are very variable and the monospecificity prevails in numerous samples. Ostracodes appertain to the Eifelian which is the lowermost part of the Eifelian Stage of the Early Devonian period. Three mega-assemblages are recognized in the Devonian: 1. The Eifel Mega-Assemblage generally characterized by a rich and diversified ostracode fauna is indicative of shallow marine (neritic), semi-restricted or lagoonal environments; 2. The Thuringia Mega-Assemblage characterized by spiny ostracodes is indicative of deep and (or) cold marine environments; 3. The Myodocopida Mega-Assemblage characterized by entomozoid and (or) cyprinoid ostracodes is indicative of poorly oxygenated/water conditions.

1. Trois-Fontaines Fm: The very base of the section investigated (MH-1 to MH-10) was shallow marine, agitated, and well oxygenated as indicated by the presence of broken carapaces and by the predominance of Podocopia belonging to two thick shelled genera of the Pachydomelidae (Tubulihardia and Microchelina). Then from sample MH-12 to MH-119, the environment was generally lagoonal as attested by the abundance of Leperditicopida belonging to the genus *Herrmannina*. The absence of ostracodes between samples MH130 and MH137, and between samples MH43 and MH68, is probably indicative of very stressful lagoonal conditions. Sometimes the environment was semi-restricted with a strong marine influence (samples MH-25, MH-43). In the top of the Trois-Fontaines Fm, the ostracode fauna are rare and poorly diversified (MH-145, 154), or absent (MH149, 151), atestino of very shallow semi-restricted water conditions.

2. Terres d'Haur Fm: In the upper part of the investigated section, the environment was semi-restricted (MH-157, 158 and 180 in which the monospecificity prevails) or more frequently shallow marine (MH-165 and MH-186) but in that case, the energy of the environment was apparently never very strong. In sample MH-165 some stacked valves have been extracted. These stacked ostracode valves are related to the action of a moderate but continue action of waves.

The thickness of the level rich in Leperditicopida which reach about 40 m in the Trois Fontaines Fm exposed in the Rancennes quarry, is recognizable on hundreds kilometers.

Distribution of ostracodes in the Trois Fontaines Fm and Terres d'Haur Fm. The boundary is located between samples 154 and 155.

The Rancennes Fm exposed in the Rancennes quarry, is recognizable on hundreds kilometers.

Valves are related to the action of a moderate but continue action of waves.
187 samples have been collected for the petrography in order to constrain the palaeoenvironments. The eight recognized microfacies point to a flat sand flat system with various subenvironments such as restricted intertidal, supratidal and channel deposits (microfacies 3-7). This system was bordered by more subtidal open marine deposits where former reefal constructions have been destroyed (microfacies 3). Frequent oscillations in this low-gradient shallow platform led to the exposure and modification of marginal ponds, floodplain environments or palaeochannels (microfacies 8).

No evaporitic environments or sakkha have been encountered.

Detailed interpretation of the microfacies reveals that the Trois-Fontaines Fm consists mainly of a protected shallow lagoon with different environments from the back-reef area to the continental plain and that the Terres d'Haurs Fm is characterized by open marine environments. In the first formation, the fauna and microflora are endemic and dominated by a few species (algae, ostracodes), in the second the organisms are diversified and abundant. In reality, the sedimentary system shows the evolution of a shallow restricted carbonate platform (Trois-Fontaines Fm) which is very extensive to a carbonate ramp setting which is probably of large extension. This evolution of the platform to a ramp could be related to the disappearance of the active role of the reefal barrier related or unrelated to syndepositional tecstonism and block faulting.

**Rock facies**

**Magnetic susceptibility (MS) data were acquired with a Kappabridge MK1-A. MS values range between 0.1 x 10^-3 and 3.0 x 10^-3 m^3/kg.**

The magnetic data shows that MS are controlled by ferromagnetic minerals and that MS are partly paramagnetic minerals and the main carrier controlling the MS signal in these Givetian limestones.

**Main features of Rancennes microfacies (MF1-8, first column; lithology, second column and palaeoenvironment, third column) and comparison with Givetian microfacies of the Standard sequence established by PREAT & MAMET (1998) in fourth column.**

<table>
<thead>
<tr>
<th>MF</th>
<th>LITHOLOGY</th>
<th>PALEOENVIRONMENT</th>
<th>GIVETIAN STANDARD SEQUENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Crinoidal-brachiopackstones with reeal bioclasts</td>
<td>Open marine, fore-reef slope</td>
<td>MF3</td>
</tr>
<tr>
<td>2</td>
<td>Stromatoporoid floatstones</td>
<td>Subtidal peri-reefal channels</td>
<td>MF6</td>
</tr>
<tr>
<td>3</td>
<td>Ortic bioclastic packstones</td>
<td>Intermediary sandy shoals</td>
<td>MF7c</td>
</tr>
<tr>
<td>4</td>
<td>Bioclastic packstones and calcispherid-Lepedicticopida wackestones</td>
<td>Subtidal restricted lagoon</td>
<td>MF8-9</td>
</tr>
<tr>
<td>5</td>
<td>Intraskeletal bindstones and Lewisites</td>
<td>Inter-supertidal lagoon ridge</td>
<td>MF11</td>
</tr>
<tr>
<td>6</td>
<td>&quot;Cryptalgal&quot; laminites</td>
<td>Inter-supertidal levees</td>
<td>MF12</td>
</tr>
<tr>
<td>7</td>
<td>Mudstone-wackestones with laminar crusts and rhizococonctents</td>
<td>Palustrine and palaeols</td>
<td>MF137</td>
</tr>
</tbody>
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