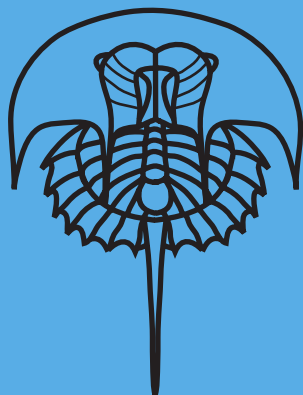




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Sylvain Charbonnier

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THE MIDDLE JURASSIC LA VOULTE DECAPOD FAUNA

SYLVAIN CHARBONNIER

Muséum national d'Histoire naturelle, Paris, Centre de Recherche en Paléontologie – Paris (UMR 7207),
sylvain.charbonnier@mnhn.fr

The Middle Jurassic La Voulte-sur-Rhône Lagerstätte (France) is characterized by a diverse and exceptionally well-preserved bathyal palaeocommunity, dominated by arthropods (CHARBONNIER, 2009; CHARBONNIER & others, 2007, 2014) (FIG. 1). It was deposited along the western Tethyan margin, where the submarine relief was steep, and sedimentation was dominated by thick marls, which suggests a low energy and deep-water depositional environment, with dim-light conditions (CHARBONNIER, 2009). Massive iron deposits and metallic minerals suggest submarine hydrothermal activity linked to tilted blocks and listric faults. Hydrothermal activity might have played an important role in the mineralization of soft tissues that probably occurred via diverse and complex pathways (WILBY, BRIGGS, & RIOU, 1996; JAUVION & others, 2019). Arthropods comprise most of the La Voulte biota in terms of diversity and abundance (CHARBONNIER & others, 2010). Fossilization occurred either in early diagenetic concretions or nodules within which they are three-dimensionally preserved or in surrounding marls where they are flattened and likely preserved in pyrite and phosphate. Arthropod groups include malacostracan crustaceans (Decapoda, Mysida, Lophogastrida, Cumacea, Stomatopoda), thylacocephalan crustaceans (VANNIER & others, 2016; LAVILLE, FOREL, & CHARBONNIER, 2023), and pycnogonid arthropods (CHARBONNIER, VANNIER, & RIOU, 2007;

SABROUX & others, 2023). Decapods exhibit high diversity, with 15 species (TABLE 1).

Polychelidan lobsters were abundant and diverse (eight genera; AUDIO & others, 2014; AUDIO & SCHWEIGERT, 2018) (FIG. 1.4–1.8). Comparison of specific, generic, and familial diversity of various Jurassic Lagerstätten yielding multiple species of polychelidan lobsters highlights that the La Voulte Lagerstätte displays the second highest specific, and the highest generic and familial, diversity (AUDIO & others, 2014). Some specimens preserved in carbonate concretions have yielded particularly interesting palaeobiological data about the reproductive strategy of the group during the Jurassic. A specimen of *Voulteryon parvulus* AUDIO & others, 2014, was identified as a female based on mature ovaries (JAUVION & others, 2016; AUDIO & others, 2019), and brood care was demonstrated in a female of *Palaeopolycheles nantosueltae* bearing hundreds of eggs attached to the pleon (JAUVION & others, 2020) (FIG. 1.6, 1.7).

Dendrobranchiate shrimps are represented by only two species (JAUVION, CHARBONNIER, & BERNARD, 2017) but were very abundant (FIG. 1.1, 1.2). For instance, *Archeosolenocera straeleni* CARRIOL & RIOU, 1991, represents 22% of the arthropod specimens preserved in La Voulte nodules (CHARBONNIER & others, 2010). It is also the oldest representative of Solenoceridae. Genera referred to Procaridea and Caridea need to be carefully revised since the

Table 1. Decapod faunal list for the Middle Jurassic (Callovian) La Voulte-sur-Rhône Konservat Lagerstätte (France).

Dendrobranchiata Aegeridae <i>Aeger brevirostris</i> VAN STRAELEN, 1923 Solenoceridae <i>Archeosolenocera straeleni</i> CARRIOL & RIOU, 1991 Procaridea <i>Udora gevreyi</i> VAN STRAELEN, 1923 <i>Udora minuta</i> VAN STRAELEN, 1923 Polychelida Coleiidae <i>Palaeopolycheles nantosueltae</i> JAUVION & others, 2020 <i>Proeryon charbonnieri</i> AUDIO & SCHWEIGERT, 2018 <i>Willemoesiocaris ovalis</i> (VAN STRAELEN, 1923)	Eryonidae <i>Eryon ellipticus</i> VAN STRAELEN, 1923 <i>Soleryon giganteus</i> (VAN STRAELEN, 1923) <i>Voulteryon parvulus</i> AUDIO & others, 2014 Polychelidae <i>Hellerocaris falloti</i> (VAN STRAELEN, 1923) Family uncertain <i>Adamanteryon fourneti</i> AUDIO & others, 2014 Glypheidea Glypheidae <i>Glypheopsis vouldensis</i> CHARBONNIER & others, 2013 Astacida Erymidae <i>Eryma ventrosum</i> (VON MEYER, 1835) Stenochiridae <i>Stenochirus vahlldieki</i> SCHWEIGERT, GARASSINO, & RIOU, 2006
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pioneering studies of VAN STRAELEN (1922, 1923, 1925), but two La Voulte species currently are referred to Procaridea. Erymid and stenochirid lobsters are present, but rare (SCHWEIGERT, GARASSINO, & RIOU, 2006; DEVILLEZ & CHARBONNIER, 2021), with some spectacular specimens bearing soft-parts (CHARBONNIER & others, 2024) (FIG. 1.3). The first glypheid lobster from La Voulte, *Glypheopsis vouldensis* CHARBONNIER & others, 2013, was described recently based on a unique specimen (CHARBONNIER & others, 2013). Other decapods (e.g., palinurid lobsters, penaeoid shrimp) and diverse peracaridans and stomatopods from La Voulte remain to be revised or described. For instance, the presumed penaeid *Rhodaniscaris depereti* VAN STRAELEN, 1925, is actually a lophogastrid crustacean (Gnathophausidae). In conclusion, the La Voulte crustacean fauna is a spectacular treasure trove of information crucial for the understanding of deep marine paleoenvironments because it is one of the richest and most complete localities for the Mesozoic known to date.

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ABBREVIATIONS FOR MUSEUM REPOSITORIES

- UCBL-FSL: Université Claude Bernard Lyon 1, France
- MNHN.F: Muséum national d'Histoire naturelle, Paris, Collection de Paléontologie, France
- UJF: Université Grenoble Alpes, France



FIG. 1. 1, *Aeger brevirostris*, MNHN.FR61863; 2, *Archeosolenocera straeleni*, UCBL-FSL 170560; 3, *Eryma ventrosum*, UJF-ID11543; 4, *Eryon ellipticus*, UJF-ID11540; 5, *Voulteryon parvulus*, MNHN.FA50708; 6, 7, *Palaeopolycheles nantosueltae*, MNHN.FA58254, 3D model; 8, *Willemoesiocaris ovalis*, MNHN.FA29521. Images: P. Loubry (1), N. Podelvigne (2, 3), D. Audou (4, 5, 8), N. Poulet (6, 7). Species authorships given in Table 1.

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