ICHNOFACIES OF THE LATE JURASSIC SMACKOVER "C" SANDSTONE, CLAIBORNE AND WEBSTER PARISHES, LOUISIANA: INDICATION OF THE ENVIRONMENT OF DEPOSITION

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ABSTRACT

The Smackover "C" sandstone of late Jurassic age has been an economic primary or secondary drilling target for several years. Recent drilling activity at Haynesville field and surrounding areas of Claiborne and Webster Parishes has demonstrated the importance of the Smackover "C" sandstone as a hydrocarbon reservoir and has provided an abundance of well data including conventional cores from the interval.

Ichnofossils (trace fossils) have been observed in several of the conventional cores taken through the Smackover "C" sandstone interval. These ichnofossils can be very important clues to the environment of deposition in which the Smackover "C" sandstone was deposited. An understanding of the environment of deposition will allow better exploitation of this particular lobe of Smackover "C" sandstone at Haynesville field and surrounding areas as well as aid the explorationist in searching for other similar deposits of the late Jurassic within the Gulf Coast basin.

Ichnofossils as a whole are not abundant. On a scale from one to six the ichnofabric index (after Droser and Bottjer, 1986) is a one to two with the exception of a few interbedded shales that have an index of three. The three types of ichnofossils that have been recognized are dwelling structures (domichnia), feeding structures (fodinichnia), and escape structures (fugicnia). Ichnofossils of the Smackover "C" sandstone are normally found within 10 centimeters (four inches) of the sandstone-shale sediment interfaces (Figure 1) and are mostly horizontal with a few being vertical. The burrow diameters range in size from a few millimeters to 2.5 centimeters with most being just a few millimeters in size (Figures 1 and 2). Most of the burrows are filled with shale.

Chondrites (Figure l) is the most common ichnogenus observed but a few *Planolites* (Figure 2), *Teichichnus, Scalarituba* (Figure 3), *Thalassinoides* (Figures 4 and 5), *Rhizocorallium* and *Conostichus* have also been recognized. The actual presence of burrowing organisms in a vertical orientation together with the types of observed ichnogenera are both characteristic of the *Cruziana* ichnofacies. Burrowing organisms were either living in or were transported to the circalitoral transition zone offshore below storm weather wave base by event deposition. A shaley unit below the base of the sandstone in a core that was taken at the northwest margin of the lobe contained a large *Thalassinoides* (Figures 4 and 5) burrow. This would seem to suggest that water conditions were quiet and shallow just prior to deposition of the Smackover "C" sandstone. The Jurassic sea transgressed northward onto the continental margin creating an overall deepening-upward sequence. The depositional environment changed from a shallow inner shelf environment to a deeper middle shelf environment onto which sandstones were deposited by event deposition. Sediments were preserved because of the deepening sea conditions as the depositional lobe remained below storm weather base. The size, abundance, and diversity of the ichnogenera indicate an environment of very low oxygen. Depositional events and the transportation of sands offshore supplied oxygenated waters that allowed organisms to live. These depositional events are currently being studied to determine whether they were generated by storm or turbidite activity.

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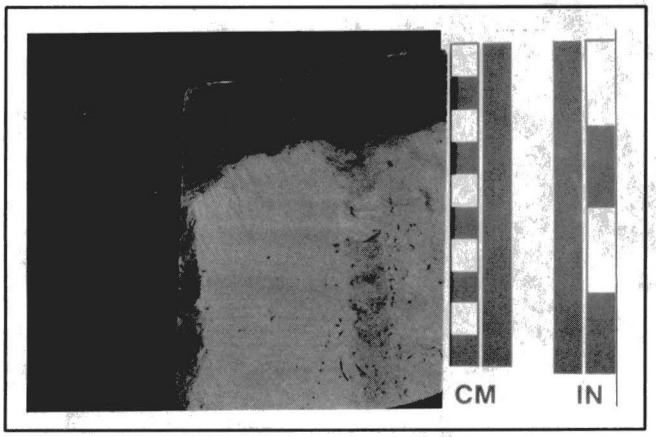

Figure 1. Composite burrow consisting of *Chondrites* and an escape burrow. Note the escape burrow is continuous up to the shale-sandstone interface. The *Chondrites* developed later, following possible local increase in oxygenation of the sediment due to disturbance while forming the escape burrow. From the Dykesville Field area, Webster and Claiborne Parishes, Louisiana, at a depth of 11,488 feet.

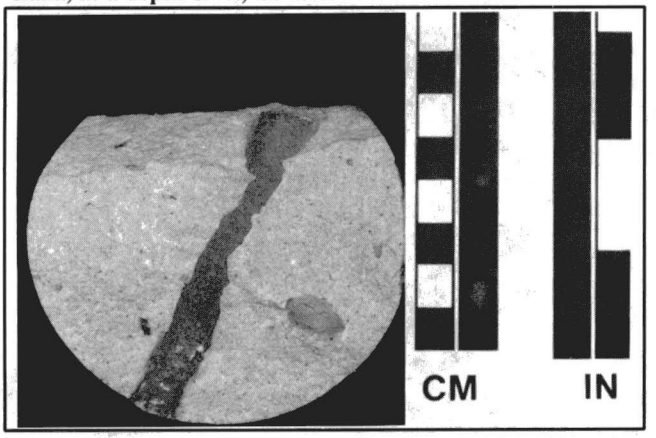

Figure 2. Large horizontal *Planolites* in map view. Note the mud rim surrounding the burrow. From Wheless Sale No. 1, Sec.19, T23N, R8W, in the Haynesville Field area, Claiborne Parish, Louisiana.

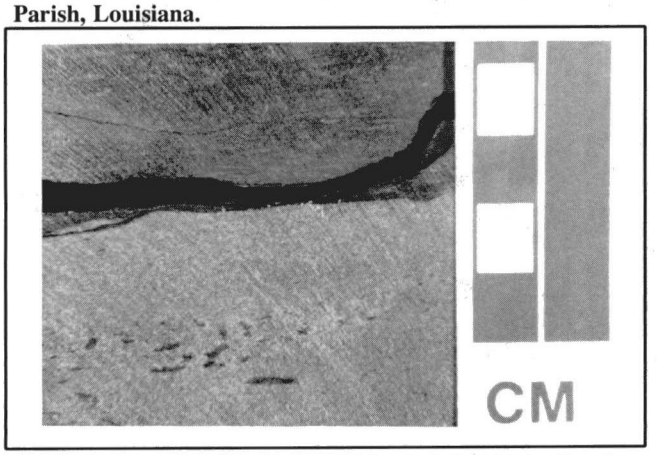

Figure 3. Cross–sectional view of *Scalarituba*. Note the clay infill. From the Wheless Burns No. 2, Sec. 34, T23N, R9W, Webster Parish, Louisiana, at a depth of 11,119 feet.

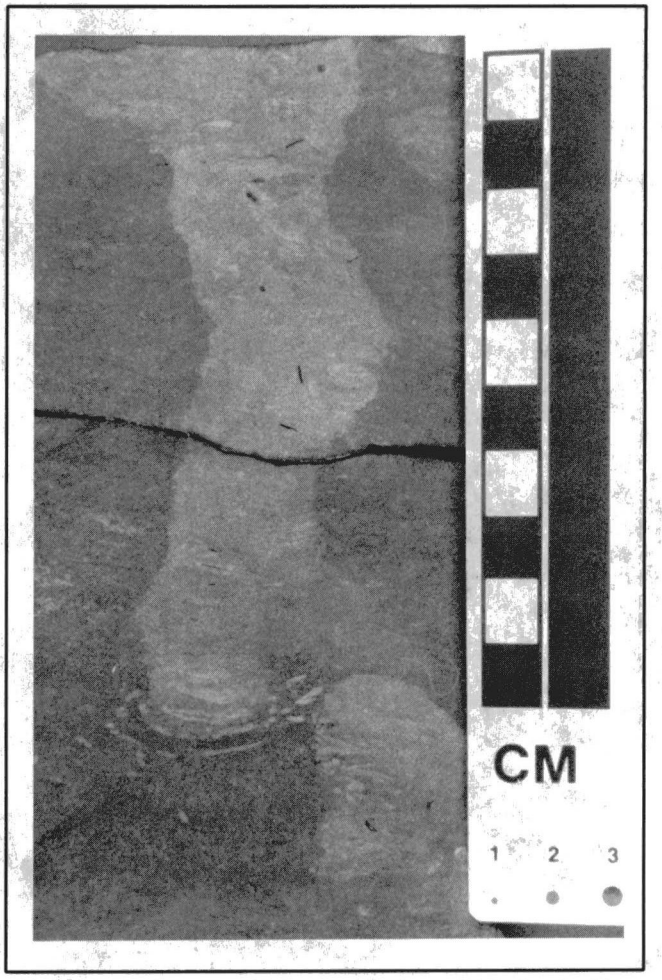

Figure 4. Cross-sectional (vertical) view of *Thalassinoides*. Note the meniscus fill in the lower portion of the vertical branch. The burrow chamber leaves the plane of view, then curves back toward the reader at the bottom of the figure. From the Mobil L. A. Sims No. 1, Sec. 4, T23N, R9W, N.Shongaloo–Red Rock Field area, Webster Parish, Louisiana.

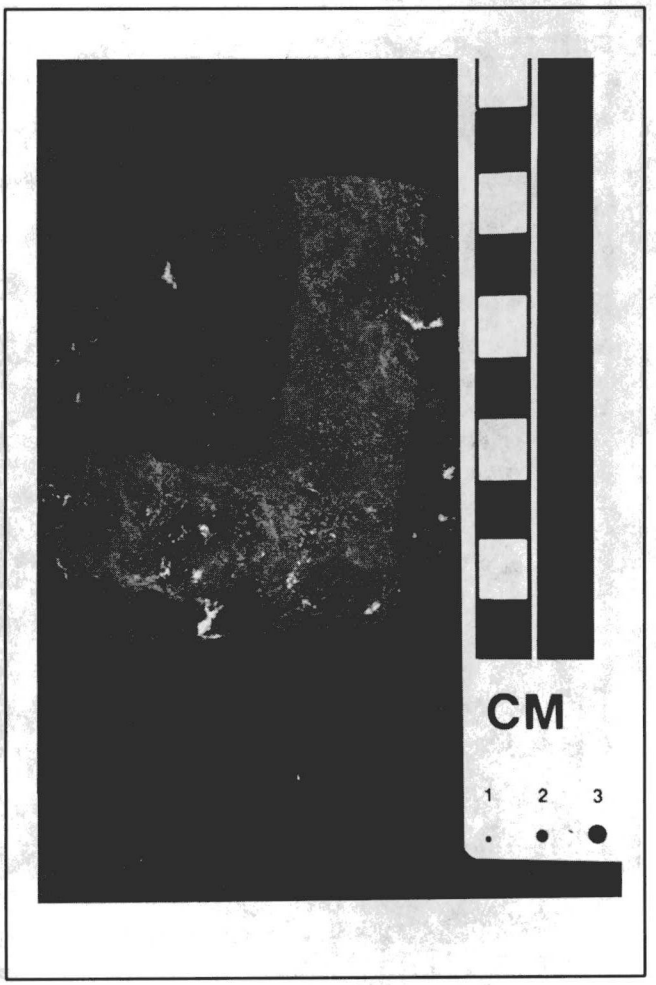

Figure 5. Plan view of *Thalassinoides*. This horizontal view is located just below the vertical view shown in Figure 4. Note the horizontal branching. Well and location as in Figure 4.