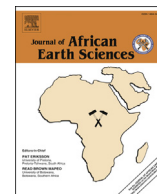


Contents lists available at ScienceDirect

Journal of African Earth Sciences

journal homepage: www.elsevier.com/locate/jafrearsci

Middle to late Cambrian shallow marine trace fossils from the Imfout Syncline (Western Meseta, Morocco): Palaeoecological and palaeoenvironmental significance in NW-Gondwana



Mostafa Oukassou ^{a, *}, Abdelouahed Lagnaoui ^{b, c}, Mohammed Raji ^a, André Michard ^d, Omar Saddiqi ^e

^a Laboratory "DBSCG", Department of Geology, Faculty of Sciences Ben M'sik, Hassan II University of Casablanca, B.P. 7955, Sidi Othman, Casablanca, Morocco

^b Laboratory of Stratigraphy of Oil and Gas Bearing Reservoirs, Department of Paleontology and Stratigraphy, Institute of Geology and Petroleum Technologies, Kazan (Volga Region) Federal University, Kremlyovskaya Str. 18, 420008, Kazan, Russia

^c Laboratory of Geodynamic and Geomatics, Department of Geology, Faculty of Sciences, Chouaib Doukkali University, B.P. 20, 24000, El Jadida, Morocco

^d Em. Pr. Paris-Sud University, 10, Rue des Jeûneurs, 75002, Paris, France

^e Laboratory "Geosciences", Department of Geology, Faculty of Sciences Ain Chock, Hassan II University of Casablanca, B.P.5366, Maârif, Casablanca, Morocco

ARTICLE INFO

Article history:

Received 11 July 2016

Received in revised form

1 February 2017

Accepted 2 February 2017

Available online 3 February 2017

Keywords:

Trace fossils

*Selenichnites**Skolithos* ichnofacies

Middle-late Cambrian

El Hank Formation

Moroccan Meseta

ABSTRACT

The present research provides the first evidence of invertebrate activity assigned to the ichnogenus *Selenichnites* occurring together with moderately diverse ichnofossils from the middle to late Cambrian of the Moroccan Meseta. The invertebrate traces occur in sandstone strata of the El Hank Formation within the Imfout Syncline, in the northern part of the Rehamna Massif (Coastal Block, western Moroccan Meseta). Bedding surfaces from the top of the El Hank Formation near the Imfout Dam show diverse forms of current ripples and distincts crescentic ichnofossils in concave epirelief scattered on the surface. In this section, the traces provide evidence of the ethology of an organism inhabiting the relatively shallow waters of the area during this time. *Selenichnites* co-occurs with the ichnogenera *Arenicolites*, *Diplocraterion*, *Lingulichnus*, *Monocraterion*, *Skolithos* and unidentified burrows, and the ichnoassemblage is referred to the *Skolithos* ichnofacies.

These traces can be referred to arthropods (e.g. polychaete worms and amphipod crustaceans), lingulid brachiopods, annelids and/or phoronids. The Imfout *Selenichnites* represents the first occurrence of this ichnogenus from the Cambrian of the Moroccan Meseta, and the second from the Cambrian deposits of Morocco. The potential tracemakers are still questionable, but were most likely xiphosurans, trilobites, euthycarcinoids or crustaceans. If so, the Imfout traces could be among the oldest pieces of evidence for the presence of horseshoe crabs during the Cambrian.

The combination of sedimentological and ichnological data indicates that the El Hank Formation was deposited in a sublittoral soft ground environment next to a sandy shore. It was originally part of an early Palaeozoic shallow marine epicontinental platform in west-central Morocco. In addition to the equivalent Cambrian deposits from the Anti-Atlas, the El Hank Formation constituted a part of the northern Gondwana platform domain during the transgression coming from the Rheic Ocean onto the West African Craton margin.

© 2017 Elsevier Ltd. All rights reserved.

1. Introduction

Trace fossils provide only conjectural information on the nature of the living organisms responsible for the traces, but conversely they provide a unique window into behaviour that body fossils cannot provide. The ichnogenus *Selenichnites* is a stratigraphically

* Corresponding author.

E-mail addresses: mostafa.oukassou@univh2m.ma, mostafa.oukassou@gmail.com (M. Oukassou).