

***Aspidella*: the Ediacaran body fossil from the Jodhpur Sandstone of the Marwar Supergroup, Sursagar area, Jodhpur, western Rajasthan, India**

Aspidella: un fósil de cuerpo blando ediacárico de la Arenisca de Jodhpur (Supergroup de Marwar), área de Sursagar, Jodhpur, Rajasthan occidental, India

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ABSTRACT

This paper describes well-preserved *Aspidella* remains, the Ediacaran body fossils from the Jodhpur Sandstone of the Marwar Supergroup in Sursagar area, Jodhpur, western Rajasthan, India. They show distinct morphological features previously described in other famous Ediacaran fossil sites, such as the Fermuse Formation of Newfoundland, South Australia and White Sea of Russia

Keywords: *Aspidella*; Jodhpur Sandstone; Ediacaran; Rajasthan; India.

RESUMEN

Se describen en este trabajo los restos bien conservados de *Aspidella*, fósiles de cuerpo blando ediacáricos de la Arenisca de Jodhpur (Supergroup de Marwar) el área de Sursagar, Jodhpur, al oeste de Rajasthan, India. Éstos muestran características morfológicas características descritas anteriormente en otros famosos yacimientos fósiles ediacáricos, como los de la Formación de Fermuse (Terranova), Australia meridional y el Mar Blanco de Rusia.

Palabras clave: *Aspidella*; Arenisca de Jodhpur; Ediacárico; Rajasthan; India.

Introduction

The present paper describes well-preserved *Aspidella* remains, the Ediacaran body fossils from the Jodhpur Sandstone of the Marwar Supergroup in Sursagar area, Jodhpur, western Rajasthan, India. The Jodhpur Sandstone is the basal and significant group of the Marwar Supergroup (MSG).

Results

The Marwar Supergroup was earlier described as Trans-Aravalli Vindhyan as it is occurring on the western side of the NE-SW trending Aravalli Mountains, and occupies a large area in the north-western Rajasthan (Pareek, 1984; Chauhan *et al.*, 2004). It is up to 1000 m thick, unmetamorphosed

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and undeformed, highly diversified sedimentary sequences comprising sandstone, conglomerate, siltstone, dolostone, limestone and shale indicates various marine, shallow marine to sub-tidal and non-marine environments (Pareek, 1984; Pandey & Bahadur, 2009). The Marwar Supergroup (MSG) is unconformably overlying an uneven and ragged basement of the rocks of Malani Igneous Suite of 780 to 680 Ma of age (Rathore *et al.*, 1999; Gregory *et al.*, 2009). Lithostratigraphically, the Marwar Supergroup is divided into the basal Jodhpur Group followed by the Bilara Group, the Hanseran Group and the Nagaur Group at the top (Pareek 1984; Chauhan *et al.*, 2001). The Jodhpur and Nagaur groups are argillaceous-arenaceous while the Bilara Group is calcareous in nature, and the Hanseran Group is dominated by evaporite deposits. The Jodhpur Group has been further subdivided into the Pokaran Boulder Bed, the Sonia Sandstone and the Girbhakar Sandstone (Pareek, 1981). Later on both the Sonia Sandstone and Girbhakar Sandstone have merged into the Jodhpur Sandstone by Chauhan *et al.* (2004). The present *Aspidella* disc assemblages are recorded in a section, about 16 m thick, of the middle part of the Jodhpur Sandstone in Sursagar mines area. In Sursagar area, the Jodhpur Sandstone known as Sonia Sandstone of Jodhpur Group, which is located about 8 km NNE of Jodhpur city. It is represented by yellowish brown, purple and pinkish brown medium- to fine-grained sandstone, siltstone and brown shale and few conglomeratic beds are also present. These beds are more or less horizontal, having laminations, ripple-marks, cross-bedding, graded bedding and rain-prints sedimentary structures (Chauhan *et al.*, 2001). Here the *Aspidella* disc remains are found in yellowish brown to pinkish brown medium- to fine-grained sandstone bedding surfaces in discoidal forms with mostly positive relief and sometime in negative relief (Fig. 1). Morphologically, these are flat, circular to sub-circular or oval -shaped discs with very sharp inner circular body. The relief of *Aspidella* discs is slightly flat and raised rim is clearly seen with positive relief. The maximum relief of the ridges is up to 4–10 mm. They occur as individuals or in a near one to another in few cases (Fig. 1d). No radial ribs were found in our *Aspidella* specimens extending from centre to margin of the discs. The diameter of *Aspidella* assemblages is in

range from 3cm-14cm, with an inner circular body from 1 to 2cm. These dimensions are common to the total range of *Aspidella* morphs compare to global compilation of *Aspidella*, but its reaches up to diameter about 50cm (Gehling *et al.*, 2000; Fedonkin *et al.*, 2007; Menon *et al.*, 2013; Tarhan *et al.*, 2015). Earlier, the *Aspidella* is interpreted as remains of mollusk, lichen, fungi, medusoid, gas-escaping circle or structure and or a concretion. According to Gehling *et al.* (2000), the *Aspidella* is most common discs as casts of the basal impression which comprises a great variety of flat morphs, and its type species is *Aspidella terranovica*, (Billings, 1872) and considered as a buried holdfast of frond-like organisms (Gehling *et al.*, 2000). Alternatively, it's represent vagile, epifaunal animals of the cnidarian or jellyfish affinity (Menon *et al.*, 2013), or may be non-metazoan, microbial organisms (Grazhdankin *et al.*, 2014; Liu *et al.*, 2015). The present specimens of *Aspidella* discs assemblages' are showing good preservation of discoidal forms (Fig. 1) and very closely similar to *Aspidella* discs from the South Australia and Fermuse Formation, Newfoundland (Gehling *et al.*, 2007). The *Hiemalora* sp., large Ediacaran discs (diameter from 22 to 4 cm), *Tirasiana disciformis*, *Medusinites asteroides*, *Anfesta*-like Ediacaran body fossils and microbial mat structures are also occurred in same *Aspidella* discs bearing horizon.

Concluding remarks

The benthic habitat interpolated from the palaeontological record yielded by the Jodhpur Sandstone of the Marwar Supergroup in Sursagar area, Jodhpur, western Rajasthan, India suggests shallow-marine environments under moderate energy conditions for yellowish brown to pinkish brown medium to fine grained sandstone of Jodhpur Sandstone of Marwar Supergroup of Sursagar area as characterizes the worldwide famous Ediacaran fossil sites including Fermuse Formation of Newfoundland, South Australia and White Sea of Russia (Gehling *et al.*, 2000, 2002, 2007; Narbonne & Gehling, 2003; Fedonkin *et al.*, 2007; Narbonne *et al.*, 2014). Detailed study of this *Aspidella* disc assemblages bearing horizon of Jodhpur Sandstone is much needed for more specific palaeoenvironment, palaeoecology and palaeobiological interpretations.

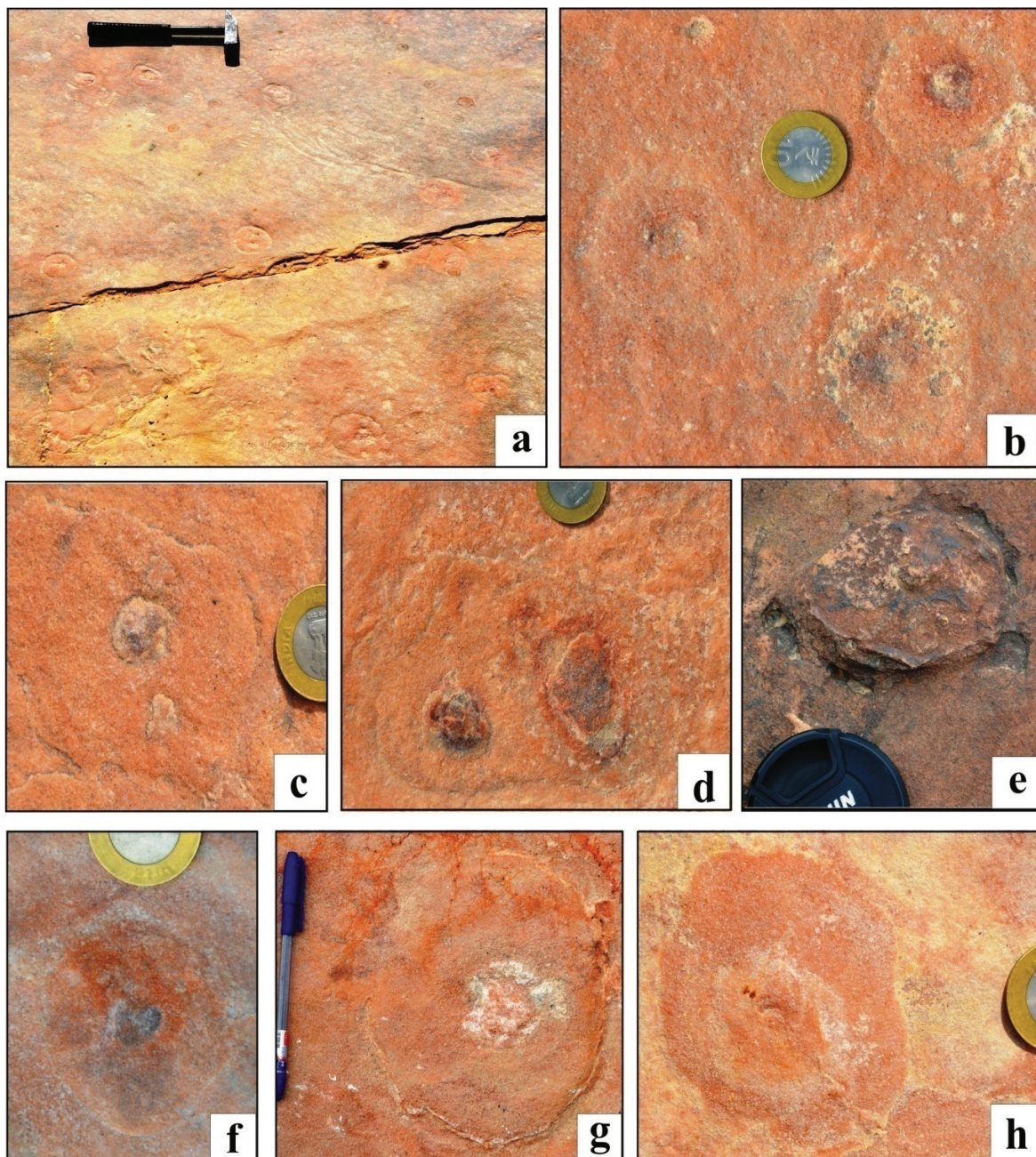


Figure 1.—A. Field photograph of *Aspidella* Ediacaran body fossils preserved in yellowish brown to pinkish brown medium to fine grained sandstone in Sursagar mines area, Jodhpur. B-H. Close-up view of well-preserved *Aspidella* specimens showing flat, circular to sub-circular or oval-shaped discoidal morphology with very sharp inner circular body and raised rim is clearly seen with positive relief; scales: length of hammer = 30 cm, pen = 14 cm and coin diameter = 2.5 cm.

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