

Paper Number: 3358

New record of organic-walled, morphologically distinct microfossils from the late Paleoproterozoic Changcheng Group in the Yanshan Range, North China

Miao, L.¹, Moczyłowska, M.² and Zhu, M.¹

¹State Key Laboratory of Palaeobiology and Stratigraphy, Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences, 39 East Beijing Road, Nanjing 210008, PR China. lanyunmiao@gmail.com

²Palaeobiology, Department of Earth Sciences, Uppsala University, Villavägen 16, SE 752 36 Uppsala, Sweden.

The Paleo- to Mesoproterozoic thick sedimentary successions overlie the Archean crystalline basement over large area in North China and are fossiliferous. The Changcheng Group in the Yanshan Range represents the lower part of the successions and consists of siliciclastic rocks and carbonates of c. 2700 m in thickness that are subdivided, in ascending order, into the Changzhougou, Chuanlinggou, Tuanshanzi and Dahongyu formations [1]. The age of the Changcheng Group is constrained by magmatic dykes, sills and volcanic flows in the succession dated to 1.68–1.63 Ga [2]. The organic-walled microfossils of this group record one of the earliest occurrences of morphologically disparate eukaryotes in China and globally. Abundant new microfossils reported here are recovered by palynological maceration from the Changzhougou Fm in Zhangjiakou area and the Chuanlinggou Fm in Jixian area.

Microfossils from the Changzhougou Fm are spheroidal, unornamented morphotypes in a size range of 25–205 µm with varied wall thickness, such as *Leiosphaeridia* spp., *Kildinella*, unnamed elongate ovoidal taxa, and vesicles with median split and petal shape of *Schizofusa*. Colonial, spheroidal cells within envelope belong to *Satka* sp. Sheets of small, tightly arranged ovoidal cells resemble geometrical pattern of multicellular algae. Vesicles with sphere-in-sphere body plan represent *Pterospermopsimorpha*, and additionally with processes on the internal body are *Trachyhystrichosphaera*. Vesicles with concentric wall striations are diagnostic of *Valeria*, and with punctuated wall are *Tasmanites*. Present record extends the stratigraphic range of *Trachyhystrichosphaera* and *Pterospermopsimorpha* [3] by some 400 Ma.

In Jixian area, the microfossils are from the basal part of the Chuanlinggou Fm. The assemblage comprises microfossils in overall size of 22–108 µm, recognized as *Leiosphaeridia* spp., *Kildinella*, *Valeria*, *Satka*, *Symplastosphaeridium*, and reticulate *Dictyosphaera*.

Morphological features, such as reticulate pattern of cell wall, granular sculpture and concentric striations on wall surface, and significantly the processes on internal body, together with large vesicle sizes are diagnostic of eukaryotic protists. The cell wall property of acid-resistance is a consistent feature. Certain microfossils preserved as half vesicles or enrolled forms are interpreted as showing median-split excystment and represent likely cyst stage in a life cycle, presumable of green microalgae. The new record of diverse, unicellular eukaryotes with prominent morphologies and complex life cycle, and of multicellular remains, indicate that by the late Paleoproterozoic the eukaryotes have already undergone a high level of phylogenetic divergences, not yet fully recognized in geological time scale to as their origins.

References:

[1] Zhu S et al. (2005) Journal of Stratigraphy 29: 437-449

[2] Lan Z et al. (2014) *Precambrian Research* 251: 21-32

[3] Moczyłowska M et al. (2011) *Palaeontology* 54(4): 721-733

