

A Burgess Shale-type Micro-*Lagerstätte* from Subsurface of SW Saskatchewan

Nicholas J. Butterfield
Department of Earth Sciences

University of Cambridge
njb1005@cam.ac.uk
Cambridge, UK CB2 3EQ

Velez, Maria, I.
Dept. of Geology

University of Regina
Regina, Saskatchewan S4S 0A2

Shale horizons from drillcore of the Middle Cambrian Earlie Formation, SW Saskatchewan, have yielded diverse organic-walled microfossils, most of which represent the disarticulated remains of non-biomineralizing metazoans and metaphytes. Some forms, such as isolated *Wiwaxia* sclerites, radular apparatus, and crustacean setal/mandibular apparatus have been previously described from the Burgess Shale, Mount Cap and other 'Burgess Shale-type' microfossil *Lagerstätten*, though the Earlie fossils offer a new level of morphological resolution. A diverse population of branching septate filaments also provides an important link between between extant siphonocladalean green algae and pre-Cryogenian counterparts.

Other forms have not been previously described. Among the most common are conspicuously spinose triangular elements comparable to the scalds of priapulids – a major component of macroscopic Burgess Shale-type biotas. Isolated sheets and cones bearing similar but much smaller series of such spines are interpreted as priapulid cuticle. Similarly common, but more problematic are square to hexagonal networks of carbonaceous fibers broadly comparable to the skeletal structure of retiolitid graptolites, though the presence of serially repeated conical extensions rules out any direct comparison.

A single mud-cracked horizon of the Earlie Formation has yielded cuticular sheets bearing a conspicuous cellular pattern and larger, structurally defined, pores. Morphologically they are indistinguishable from Silurian/Devonian *Nematothallus*, which is currently interpreted as a bryophyte-grade landplant. Absence of associated spore tetrads or water-conducting elements in the Earlie biota argues against a fully terrestrialized habit; even so, the cuticular adaptations for gas-exchange in sub-aerial environments points to the presence of terrestrial metaphytes, possibly embryophytes, by at least the Middle Cambrian.

Taken together, the Earlie *Lagerstätte* provides an important new view of the Middle Cambrian biosphere, both sub-aerially and in shallow epicratonic seas. Combined with other Burgess Shale-type microbiotas, it promises to resolve larger scale ecological and evolutionary patterns in the aftermath of the Cambrian explosion.

References

Binda, P.L., Sparks, D.E., Beaudoin, N.C., Stasiuk, L.D., Bend, S.L. Buchanan, A.A. 1996. Preliminary observations on the acid-resistant microfossils from the lower Paleozoic of southern Saskatchewan. *Saskatchewan Energy and Mines, Miscellaneous Report 96-4*, 157–165.