

# Volcanology and sedimentology of *Charnia*-bearing volcaniclastic rocks of Charnwood Forest

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**A** The internationally renowned Ediacaran fossils of the Neoproterozoic rocks of Bradgate Park, North East Leicestershire comprise of massive coarse grained sandstone units with mudstone intraclasts, interbedded with thin mudstones and sandstones.

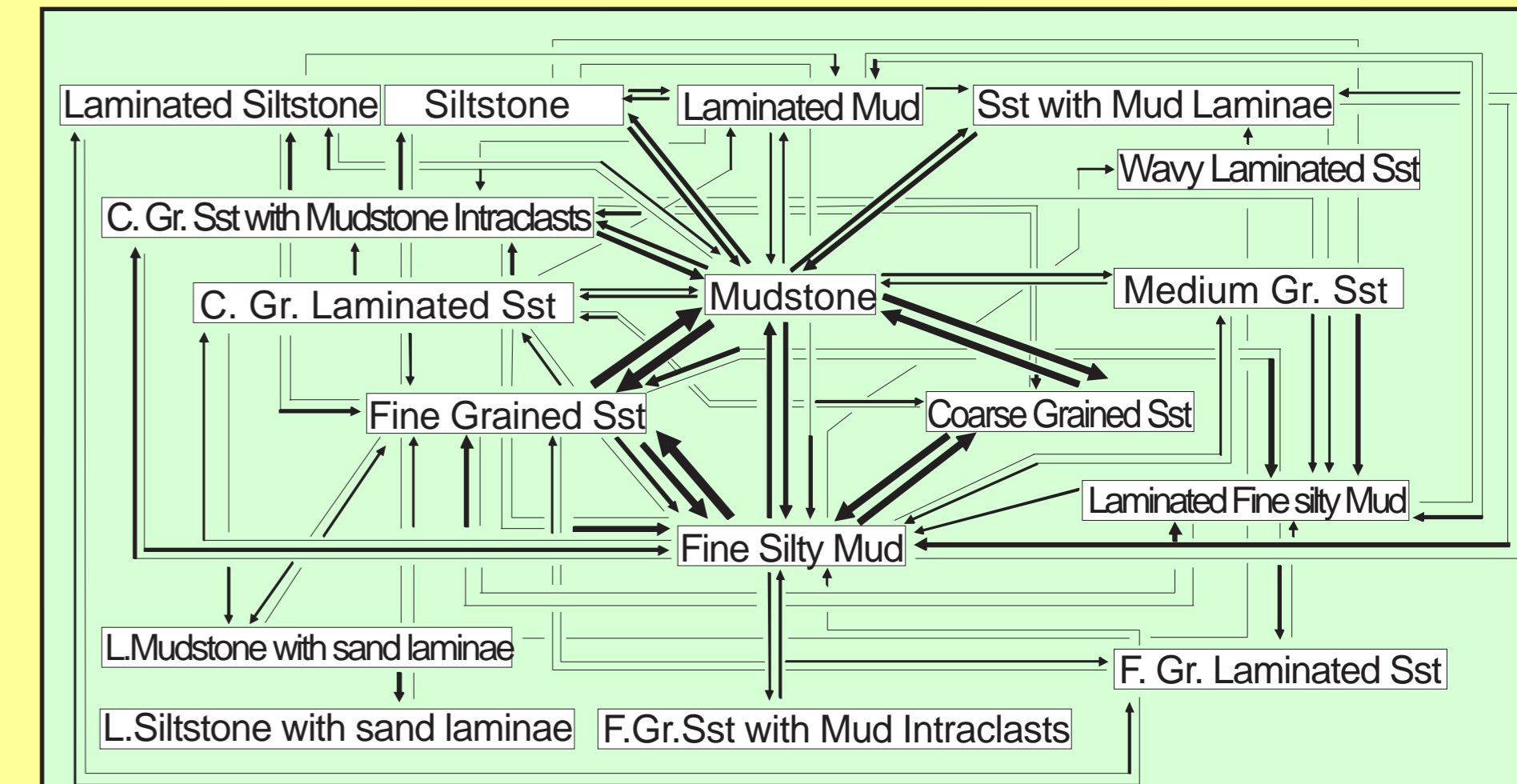
**But how were these rocks deposited? In what environment?**

Currently interpreted as a deep marine deposit [1, 2] this research aims to determine the evolution of the palaeoenvironment and to understand if other settings, such as lacustrine and subaerial, could be used to interpret the depositional environments.

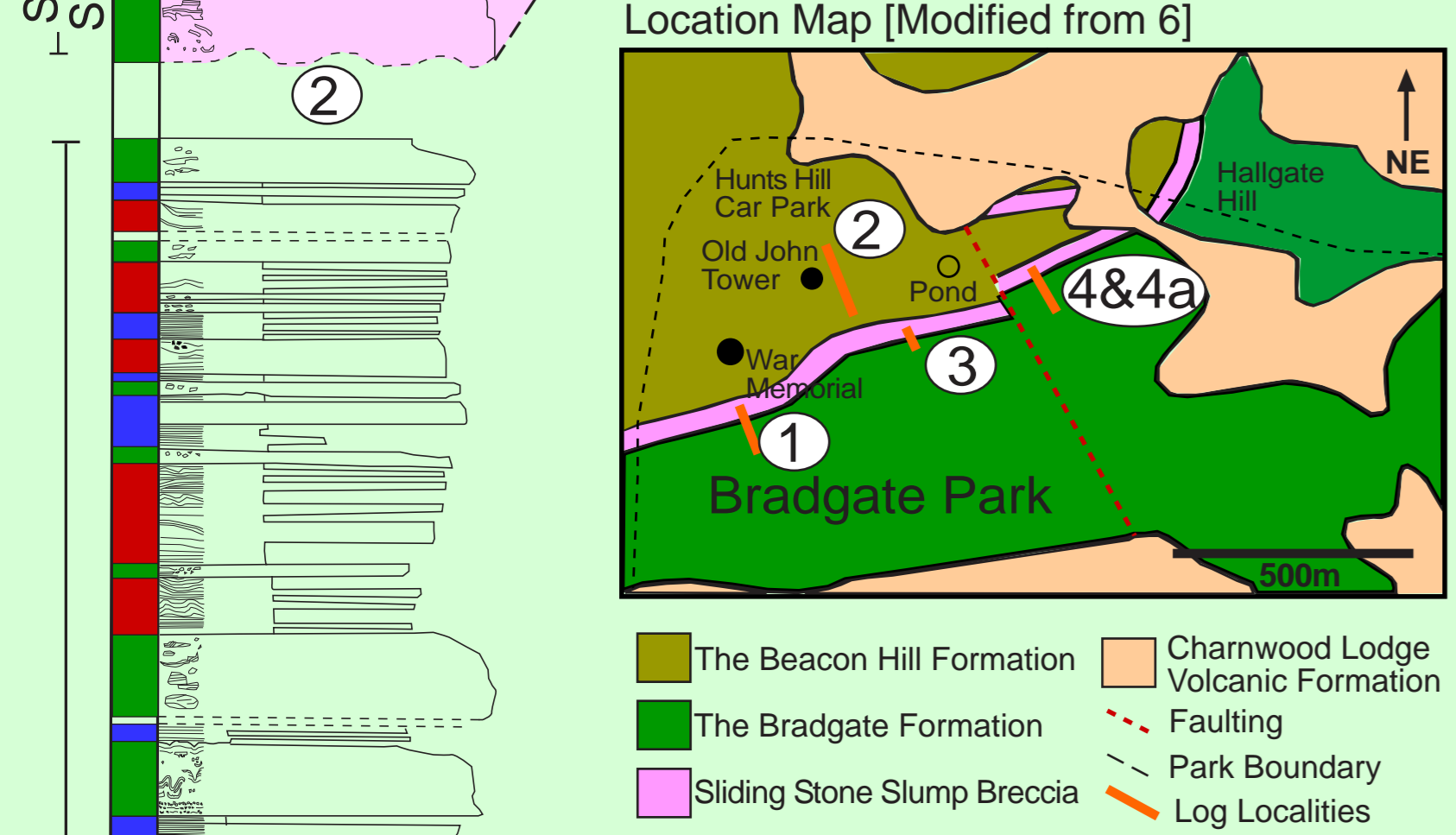
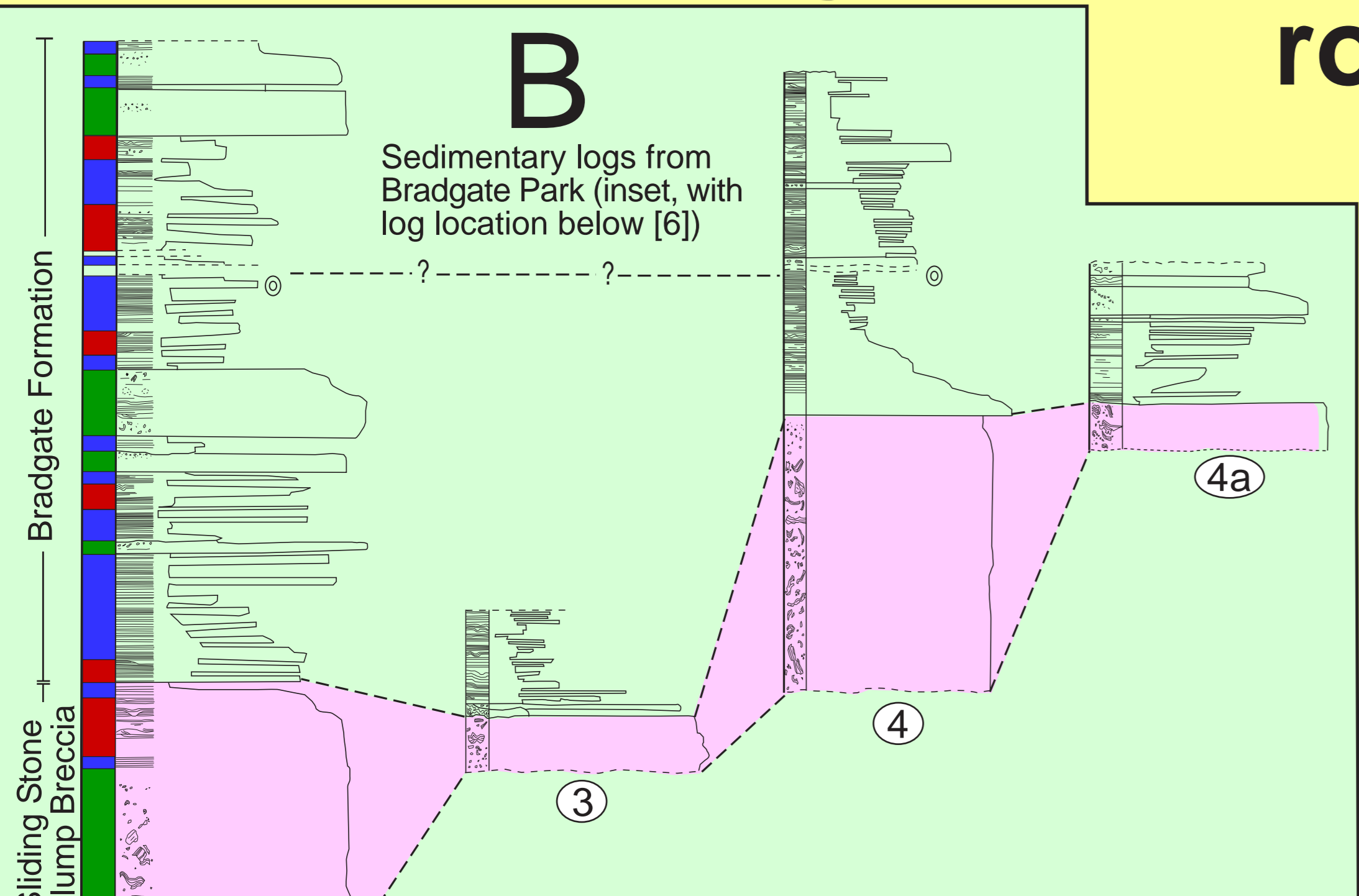
Detailed field evaluations through sedimentary logs, field sketches and correlation of exposures was carried out during summer 2010.

The formations include; the Beacon Hill Formation (fig. 3, Log A), the Bradgate Formation (fig. 3, Log B) and the Sliding Stone Slump Breccia (fig. 1&5), a well known 'marker bed' that acts as the boundary between the two formations (fig. 1) [1,4,5].

Facies interpretation and evaluation of facies associations (fig. 4) are key to understanding the depositional processes and ultimately characterize a poorly understood time period. Furthermore, it provides a depositional context for the Ediacaran fauna.



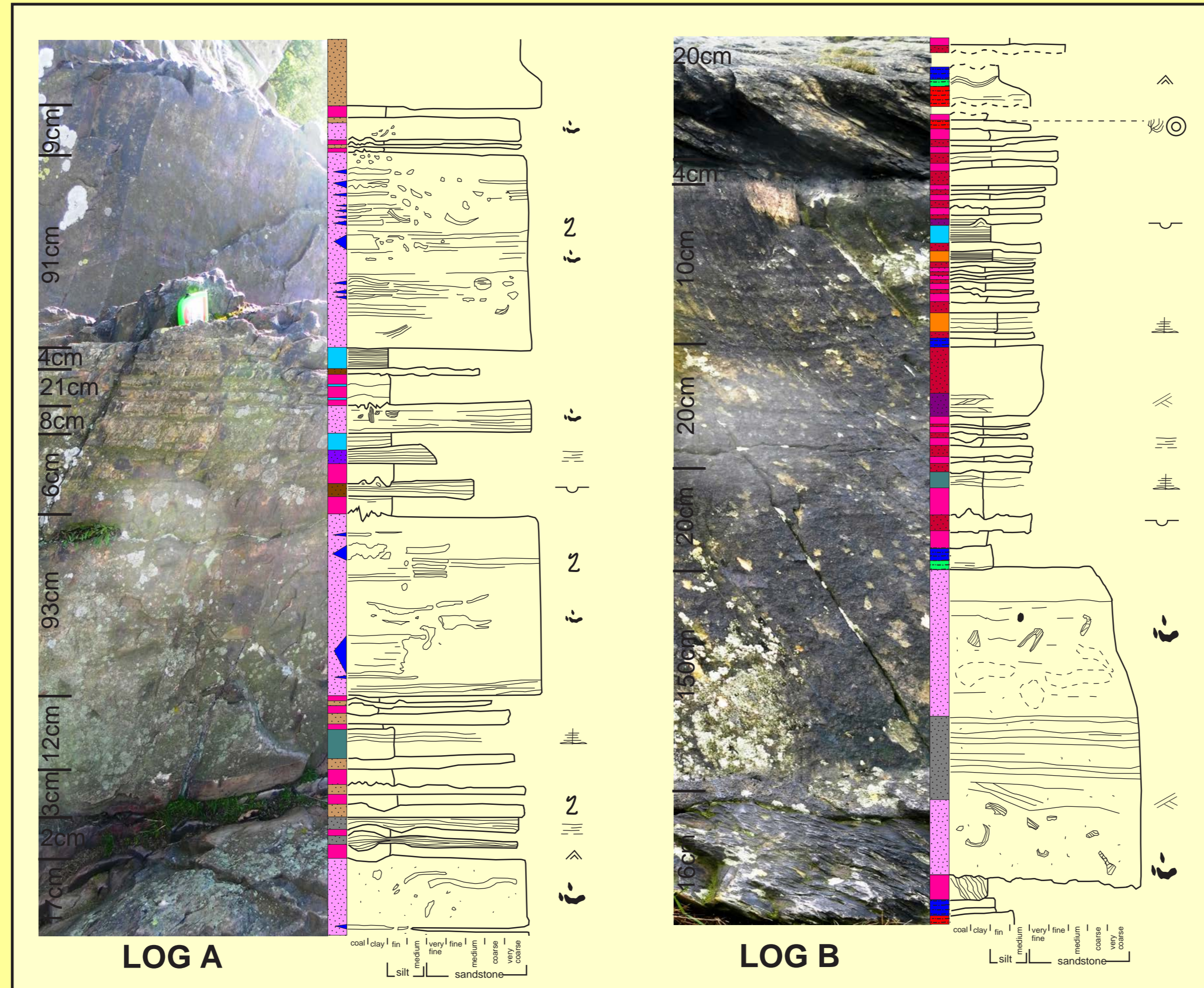
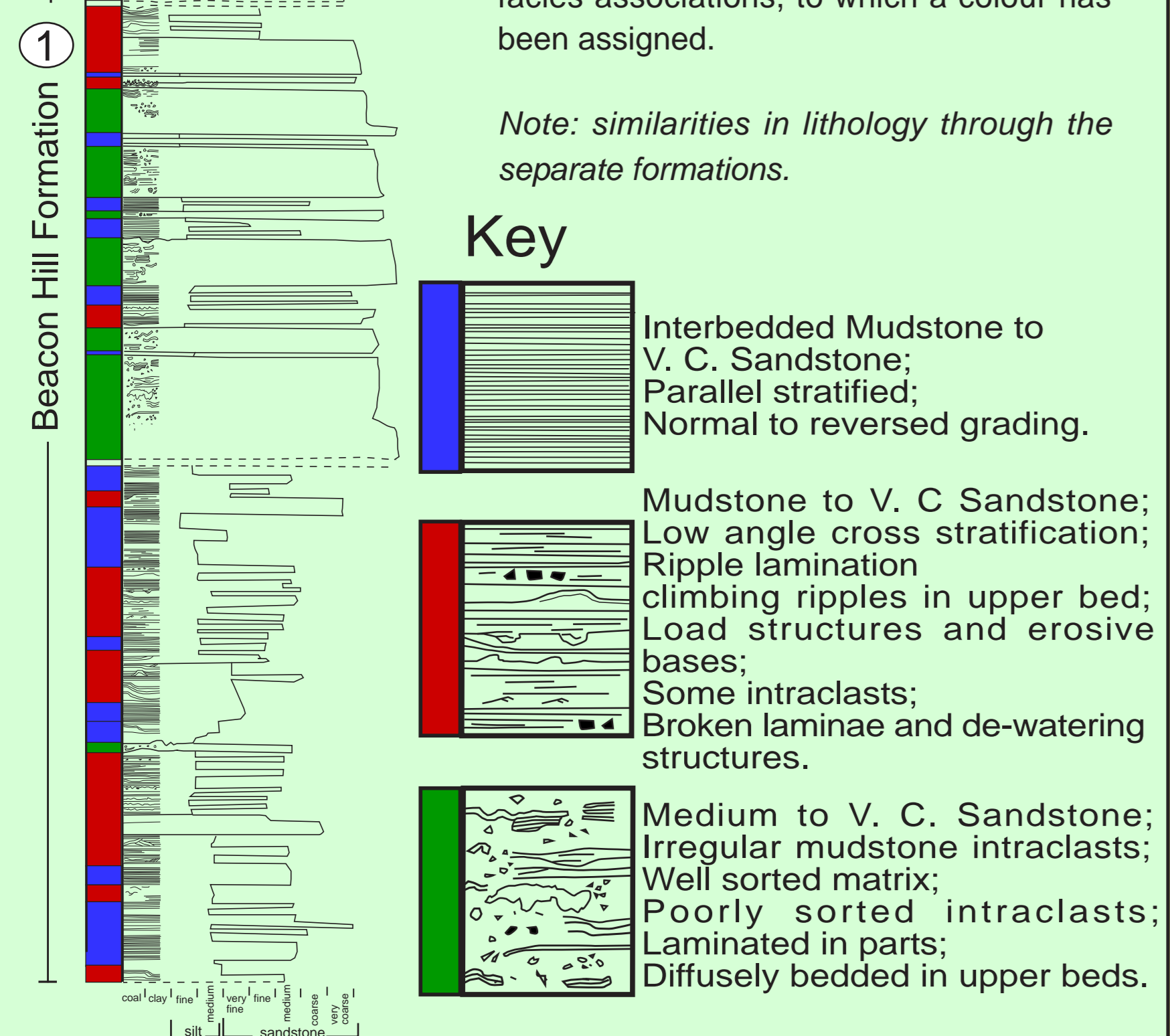
**D** **Figure 4** - Facies analysis flow diagram that depicts the frequency each facies passes up into another. Total amount of facies association is 172. **Key: (total number of upwards occurrence)**  
 2-5 → 6-10 → 10-20 → 20-30 → 30-40 →



**Figure 1** - Total logged section.

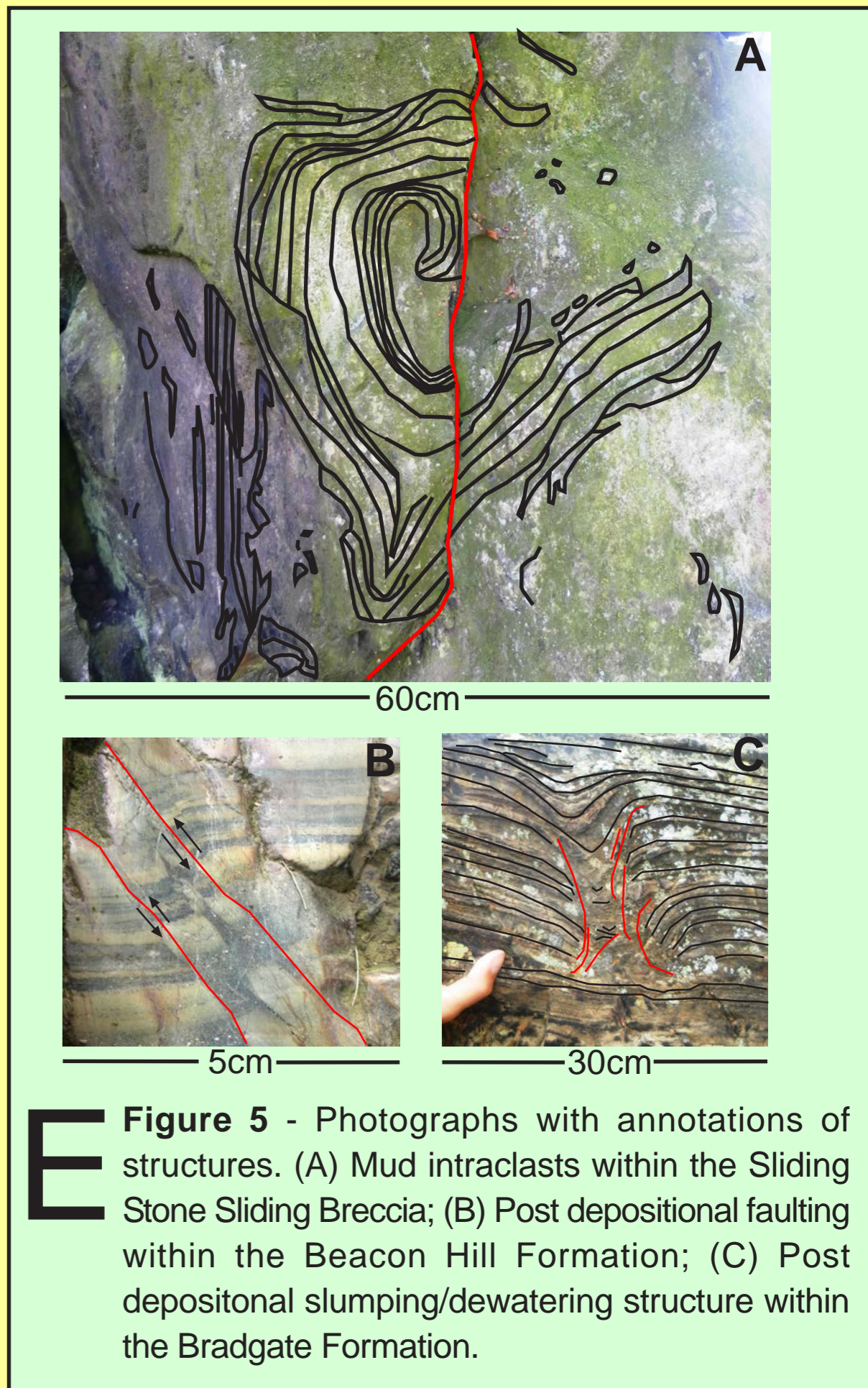
Seventeen facies have been defined (fig.3) which have been grouped into three distinct facies associations, to which a colour has been assigned.

Note: similarities in lithology through the separate formations.



**C** **Figure 3** - Two logs represent the Beacon Hill Formation (LOG A) and the Bradgate Formation (LOG B). These formations are separated by the Sliding Stone Slump Breccia (fig. 1). However the detailed logs reveal that the facies in these formations are very similar and suggest there is no change in depositional environment from before to after the deposition of the Sliding Stone Slump Breccia. This recent evaluation of the two formations would mean that it would be better described as one. Log locations on figure 2.

**References**  
 1. Carney, J.N., Ambrose, K., Brandon, A., Royles, C.P., Cornwell, J.P., and Lewis, M.A. 2001. *British Geological Survey, Sheet 141*  
 2. McIlroy, D., Green, O.R., and Mosely, J.B. (1998). *Journal of Geological Society of London*, **155**: 401-411  
 3. Carney, J.N. (1999). *Geology Today*, **15**: 221-229  
 4. Moseley, J., and Ford, T.D. (1985). *Mercian Geologist*, **10**: 1-18  
 5. Worssam, B.C., and Old, R.A. (1988). *British Geological Survey, London, Sheet 155*  
 6. Ambrose, K., Carney, J.N., Lott, G.K., Weightman, G., and McGrath, A. 2007. British Geological Survey. Map Insert.



**E** **Figure 5** - Photographs with annotations of structures. (A) Mud intraclasts within the Sliding Stone Slump Breccia; (B) Post depositional faulting within the Beacon Hill Formation; (C) Post depositional slumping/dewatering structure within the Bradgate Formation.

**F Future Research**  
 Interpret depositional environments, palaeoenvironment and volcanic setting through macro and micro observations. Assess the application of debris flow versus in situ deformation hypotheses for intra-clastic coarse sandstone beds, e.g. Sliding Stone Slump Breccia.