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# Hapsford Bridge

[ST 760 495]

## Introduction

This is the best-known locality for the Rhaetian bryophyte flora, which is dominated by the liverwort *Naiadita lanceolata*. Bryophytes are generally rare in the fossil record, but this material is outstandingly well preserved. The fossils here show full details of both sporophytes and gametophytes, including the reproductive organs.

Fossils here have been known for about 160 years from a layer of rock approximately 10 cm thick in the upper part of the Rhaetian strata that occurs extensively in the West Country and the Midlands of England. It is not, however, a homogenous unit but consists of thin layers with different fossils, of which *Naiadita* is the principal plant found. This is now known to be a liverwort and is perhaps the best example of a bryophyte preserved in British deposits.

Many of the older sites described in the literature are no longer accessible, so the Hapsford Bridge site is particularly important. This locality falls within the Vallis Vale Site of Special Scientific Interest near Frome in Somerset.

## Description

### Stratigraphy

Rhaetian deposits in the British Isles are limited to the principal outcrop stretching from Dorset to North Yorkshire and other small outcrops in Wales, Northern Ireland and Scotland. The main outcrop, which is about 30 m thick at its maximum development, includes a number of horizons that contain the remains of mostly marine animals. However, because these are mainly fish, bivalves and ammonites being absent, they cannot be accurately correlated with the typical marine Rhaetian rocks of the Alps (Warrington, 1976).

Fossil plants are scarce and, with the exception of the fissure fills in places such as Cnap Twt, they are limited to a thin, but remarkably persistent bed — the *Naiadita* bed. This is known to extend about 145 km from east of the Mendip Hills to south Worcestershire and Warwickshire. Wilson (1891) called this deposit 'Bed K', and Richardson (1911) described some sections in the region of this GCR site.

The plant-bearing layers are part of the Cotham Member, which is the lower unit of the Lilstock Formation (Warrington and Ivimey-Cook, 1992). This member consists of fine-grained, micaceous grey-green mudstones and fine white siltstones, which are over 9 m thick in eastern Lincolnshire but thin to less than a metre in Somerset. These lagoonal deposits in the Vallis Vale area were some distance from the sea and do not contain the coarser conglomerates found elsewhere. Rather they are largely composed of pale marls and limestones containing *Euestheria*, ostracods, fish scales and plants.

### Palaeobotany

The main plant fossil of the British Rhaetian flora is *Naiadita lanceolata* Buckman emend. Harris. The species was first discovered near Bristol and named by P.B. Brodie in 1845 who thought they were monocotyledonous plants. Unfortunately he published it as a *nomen nudum* and it was left to Buckman (1850) to publish the name validly. Sollas (1901) examined some new material from the Bristol area and came to the conclusion that it was a member of the Lycopodiaceae. It is now accepted that Gardner (1886b) interpreted the fossils correctly when he referred them to the bryophytes.

*Naiadita* has simple, single-cell-thick leaves borne spirally on a slender stem from which unicellular rhizoids emerge (Figure 2.4). The naked female reproductive organs, archegonia, are borne laterally on short stalks that later elongate.

They also become enveloped in scales that resemble foliage leaves. After fertilization the sporophyte grows into a spherical capsule and a minute foot. Ripe capsules are full of spore-tetrads with no sterile cells of any kind. Conical asexual gemma cups are formed on branches. *Naiadita*, as described by Harris (1938), is evidently a liverwort with a most unusual combination of characters. It is most similar to *Riella* in the Sphaerocarpales but is sufficiently different for Harris to have suggested that it cannot really be closely related to any living genus.

The alga *Botryococcus braunii* Kützing was described from the site by Harris (1938), as were some branched filaments resembling moss rhizoids. Another leafy liverwort, *Hepaticites solenotus* Harris, has been described from other localities of the *Naiadita* bed but not yet from Hapsford Bridge.

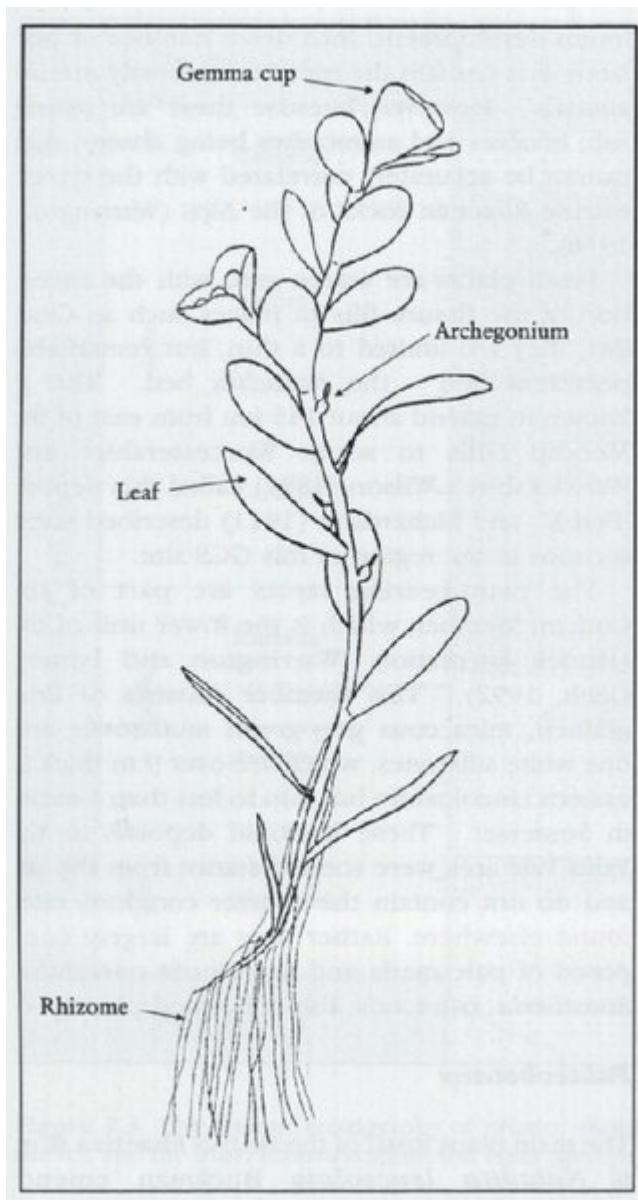
## Interpretation

The flora consists almost entirely of *Naiadita longifolia*, which has made its reconstruction considerably easier and more secure. Harris (1938) suggested that it grew as a submerged plant covering the bottom of the shallow parts of large lakes. Sedimentation in the lake preserved the adult plants and the large numbers of embryos that were starting to grow in the unconsolidated sediments before their food reserves were exhausted. Temporary marine incursions would have killed the *Naiadita* and its animal associates to form a fossil-rich bed. Regression of the sea would have been followed by the reestablishment of freshwater communities.

## Conclusion

Hapsford Bridge is an outstanding locality for the Rhaetian bryophyte *Naiadita* and a key site for understanding bryophyte evolution.

## [References](#)



(Figure 2.4) Reconstruction of *Niaidita*.