LITTLE HOYLE CAVE, TENBY, PEMBROKESHIRE: STEPHEN ALDHOUSE-GREEN'S EXCAVATIONS 1984–1990

APPENDIX 1: PALYNOLOGY OF TRENCH 4 SEDIMENTS

by

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Methodology

Sediment samples for palynological analysis were taken from the east facing section of trench NP2 (subsequently incorporated into T4) in April 1984. The sediment samples were treated using the improved palynological preparation techniques outlined by Hunt (1985), Quaternary pollen and spores being recovered from all samples (ref. Nos LH 84; NP 240 to NP 254). The results show a complex series of environmental changes in the T4 deposits at Little Hoyle. The sequence suggests a cold-warm-cold oscillation of Interstadial type.

Basal deposits

The pollen samples from this horizon should cover the period from the last Interglacial through into the Early Devensian (see table 1 in main text). Analysis of sediments from Layer 9 (among the bedrock) shows high incidences of *Pinus* (Pine) and *Ericales* (heather and heaths) with scattered occurrences of *Betula* (Birch) and *Juniperus* (Juniper). The high incidences of *Gramineae* (grasses) suggests that considerable areas of open ground existed. The presence of open ground herbs such as *Rumex obtusifolius* (Broad-leaved Dock), *Rubus chamaemorus* (Cloudberry), *Allium* type (garlics/ leeks/onions) and *Bidens* type (Bur-marigolds) would tend to support this. The presence of the montane species *Oxyria digyna* (Mountain Sorrel) indicates cold damp conditions; the high incidence of *Sphagnum* (moss) and the presence of *Selaginella selaginoides* (lesser clubmoss) would also argue for cold damp conditions at this time. The landscape was probably open, possibly resembling present day arctic pine-ericaceous heathlands

The samples from Layer 7 show an increase in the number and frequency of tree taxa. Pine is still the dominant arboreal species, followed by substantially increased incidences of *Betula* and *Juniperus*. The presence of the somewhat fragile grain of *Populus tremula* (Aspen) is recorded in low incidences. Gramineae also show an increase in frequency but a decline in relative importance. The range and frequency of herb species also increases during this period. Sphagnum declines substantially and is often absent from the record, *Selaginella selaginoides* is absent. The assemblages from Layer 7 suggest climatic amelioration, with warm dry conditions prevailing. The landscape was probably still largely open grassland, with considerable tracts of Pine-Birch-Aspen 'park woodland'.

Middle Devensian deposits

The pollen spectrum from Layer 6 is dominated by *Pinus*, with limited occurrences of *Betula* and *Juniperus*. Gramineae pollen is greatly reduced, as are the range and frequency of open ground herbs. The woodland herb *Convalleria* (Bindweed) is noted for the first time. Conditions appear damp since *Sphagnum*, Cyperaceae (Sedges, undifferentiated) and *Scheuchzeria palustris* (Rannoch Rush) are consistently represented. The assemblages from Layer 6 would suggest the presence of closed pine

woodland. However low incidences of limited numbers of open ground herbs would indicate that local areas of open ground existed, possibly in the immediate area of the cave entrance.

Layer 5 samples show a marked decline in *Pinus* and an expansion of Gramineae and open ground herbs. The montane species *Oxyria* reappears, together with the disturbed ground indicator *Hippophaëa* (Sea Buckthorn). The number of grains in the total assemblage shows a marked decline - possibly relating to a decline in biological productivity. The presence of *Lycopodium* (Clubmoss), *Sphagnum*, *Scheuchzeria palustris*, *Typha latifolia* (Great Reedmace) and Cyperaceae suggest very damp conditions. The assemblages from Layer 5 suggest the presence of an open grassland environment under very cold, wet, conditions (possibly resembling artic tundra). The low incidence of *Pinus* recorded during this period may reflect long distance transport or very limited local growth.

Upper deposits

The samples from these deposits should cover the period from the early Last Glacial Maximum to the Older Dryas (see table 1 in main text). Samples from Layer 4 display similar incidences of *Betula* and *Juniperus*. Gramineae show a relative decline, but the range and frequency of open ground herbs remain relatively constant. Ericaceous pollen is present. The assemblages from this layer suggest a possible slight amelioration at this time. However, conditions generally appear to have remained relatively cold and wet and it is possible to envisage a form of scrub or park tundra with large open expanses of grassland with a varied herb flora, punctuated by thins of Pine, Birch and Juniper.

Layer 12 forms a lens within Layer 3. Samples from this deposit show a major decrease in the incidence of *Pinus* and *Juniperus*; *Betula* was recorded by a single grain. Gramineae increase to very high levels while the presence of open ground herbs such as *Centaurea nigra* (Black Knapweed), *Ranunculus sp*. (Buttercup), *Plantago lanceolata* (Ribwort Plaintain), *Cirsium* (Thistles) and members of the Compositae (Liguliflorae) group would argue for a return to very cold, damp, conditions. The presence of Cyperaceae and *Sphagnum* would tend to support this argument. The very high incidence of Filicales (ferns, undifferentiated) would tend to suggest the growth of ferns on the rock scree habitat in the immediate area of the cave entrance. In general the assemblage from Layer 12 suggests open tree-less tundra. The low total pollen-count suggest low biological productivity in a very harsh environment.

Summary

Overall the results of the analysis indicate that the cave environs remained a largely open environment throughout the time period covered by the samples. The establishement of open conditions with some park woodland during relatively warm and dry conditions in Layer 7 is likely to co-incide with the Last Interglacial (see table 1 in main text). This is apparently then succeeded by largely open, cold and damp conditions which persist until the Older Dryas.

BIBLIOGRAPHY

Hunt, C. O. 1985. Recent advances in pollen extraction techniques: A brief review. In Fieller, N.R.J., Gilbertson, D.D. and Ralph, N.G.A. (eds.) *Palaeobiological Investigations: Research Design, Methods and Data Analysis.* Oxford. BAR International Series. **266.** 181–188.