Late Silurian-Early Devonian land plants from Spitsbergen: a glimpse of the equatorial vegetation of the Old Red Sandstone continent

TALK IN SESSION S12

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The Upper Silurian – Lower Devonian deposits of Spitsbergen are typical terrestrial-fluviatile-lacustrine 'Lower Old Red Sandstone' facies. They accumulated within the continent of Euramerica (Old Red Sandstone Continent), in a tectonically active region associated with the Caledonian Mountains. At the time of deposition Spitbergen is considered to have been located near the equator within the arid climate belt. Dispersed spore assemblages have been recovered from three areas: (A) Late Silurian deposits belonging to the Siktefjellet Group from Liefdefjorden of Haakon VII Land, resampled from historical collections of the Harland Svalbard Geological Collections (curated by CASP, Cambridge); (B) Early Devonian deposits belonging to the Wood Bay Formation from south Mimerdalen of Dickson Land, whose palynology was originally studied by Keith Allen, resampled from historical collections of the Harland Svalbard Geological Collections (curated by CASP, Cambridge); (C) Early Devonian deposits belonging to the Wood Bay Formation from east Munindalen of Dickson Land, collected on a 2010 expedition. All three localities yield at least some palynological assemblages containing abundant, well preserved spores of low thermal maturity (pale yellow). However, preservation and thermal maturity is highly variable, presumably relating to the complex syn- and post-depositional tectonic activity characteristic of the area. Dispersed spore assemblages from the Late Silurian – Early Devonian of Spitsbergen are important because: (i) They are from near the palaeoequator and, along with co-occurring plant megafossils, provide a rare insight into equatorial floras of this age; (ii) They provide evidence (age dating, stratigraphical correlation, thermal maturity) facilitating interpretation of the stratigraphy and geology of these deposits, which is vital for understanding the complex tectonic history of this region; (iii) Spitsbergen spore assemblages were important in establishing taxonomy in the fledgling days of Devonian spore research (Allen 1965) and re-examination of this material is helping to resolve various taxonomic issues that have arisen during the subsequent half century of research. Preliminary work on these spore assemblages indicates the following ages for the three localities: Pridoli (Locality A); Pragian (Locality B); late Emsian (Locality C), and further suggests there is palaeophytogeographical differentiation between dispersed spore assemblages from the equator and those from higher southerly latitudes of Euramerica.

Early Silurian Cryptospores from the Subsurface of Saudi Arabia

TALK IN SESSION S37

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Palynological assemblages from a conventional core taken during the drilling of a velocity survey well in central Saudi Arabia near Arabian Shield contained abundant cryptospores. The cored interval is within a succession of grey shale of the early Silurian Qusaiba Member, Qualibah Formation. Samples have common specimens of *Leiosphaeridia* spp. (of varying sizes), cryptospore tetrads and dyads and subordinate numbers of trilete spores (e.g., *Ambitisporites* sp.). The cryptospore component includes representatives of *Dyadospora murusattenuata/murusdensa, Hispanaediscus* sp., *Pseudodyadospora laevigata?, P. petasus?, Segestrespora laevigata, S. membranifera, Tetrahedraletes medinensis, Velatitetras laevigata* and *Vestitusdyadus qalibahinus* among others. Specimens of *Tortotubus protuberans* were also recovered. The diversity and abundance of spores indicates derivation and transport from terrestrial environments. The presence of common leiospheres suggests a shallow water depositional setting. Marine indicators, never common in the samples, include chitinozoans (*Conochitina*, *Cyathochitina* and *Belonechitina*) and fragmentary specimens of *Eupoikilofusa* sp., *Quadrisporites* spp. and rare, fragmentary *Moyeria* sp. suggests the possibility of brackish or fresh water. The complete assemblage indicates a marine, shallow water depositional setting that is near to a terrestrial source for land plant spores. This contrasts with the environment of deposition of the lower part of the Qusaiba Member in other parts of Saudi Arabia that are fully marine with common acritarchs and chitinozoans. Of particular interest taxonomically and biostratigraphically, are rare,well-preserved representatives of the permanent cryptospore dyad *Vestitusdyadus qalibahinus* Steemans, Higgs & Wellman, 2000. The dyad is thought to be enclosed by two envelopes. The outer is a thin laevigate membrane and the inner membrane is thicker and reticulate to porate, which remains when the outer membrane is mechanically removed. It was initially described from an assemblage of thermally mature cryptospores from deep exploration wells. This form is now known to be restricted to the Rhuddanian Series in Saudi Arabia and is considered to be a potential biostratigraphic index. It has been recovered from strata containing *Ancyrochitina udayamensis* and *Lagenochitina nuayyimensis*.

Fossil Woods of Yellowstone National Park, Wyoming, USA

TALK IN SESSION S5

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The early middle Eocene "Fossil Forests" of Yellowstone National Park, Wyoming, USA, are among the world's most spectacular and extensive localities for early Tertiary fossil plants. At Specimen Ridge and Amethyst Mountain in the northeastern section of the park and in the Gallatin Range in the northwestern part there are "layer cakes" of fossil forests that were entombed in successive volcanic eruptions. Most of the large upright trunks and stumps are conifers, but angiosperm woods, some exquisitely preserved, also occur. Although the Yellowstone woods have been studied since the 1890's, much of their diversity has not yet been documented. The challenges of working with these Eocene woods and determining their affinities are those typical for any early Tertiary fossil wood as-