
Palynology of the Devonian rocks of the Arabian Plate: the migration of the first forests

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Abstract

Significant published information is now available on the Devonian palynology of the Arabian Plate. The Early and Mid Devonian was a key interval in land plant evolution as it was the time when the first forests diversified and spread across the continental land areas. The Arabian Plate was a key gateway on northern Gondwana where we can monitor the spread of these forests. The available data is also continuous range data from stratigraphic wells rather than the more typical random set of outcrop samples separated in time and space.

The earliest spore that we know comes from a forest plant is *Dibolisporites eifeliensis* that is related to tree sized Cladoxylopsid plants such as the Eifelian *Calamophyton* from Germany. This spore has a much earlier base Emsian inception in Saudi Arabia. This raises the problem that the rather simple spore *Dibolisporites* may be originating from an earlier smaller plant.

Arguably the most significant component of the Devonian forests was *Archaeopteris* with its deep and laterally extensive root system. *Geminospora* has first appearances in Saudi Arabia in the early Eifelian as *Geminospora svalbardiae* and then in the Givetian as *Geminospora lemurata*. This is a significant time separation as some workers place *G. svalbardiae* in synonymy with *G. lemurata* with the latter used as a pick for the base of the Givetian. This early inception of *G. svalbardiae* is anomalous and may represent a basal group with initial separation of the spore wall layers. Coincident with the inception of *G. lemurata* is that of *Rhabdosporites langii*, the spore of Aneurophytalean progymnosperms and probably the progymnosperm stem group. In Euramerica this appears low down in the Eifelian. Above the inception of *Geminospora lemurata*, and in the mid Givetian, is the inception of its megaspore *Contagisporites optivus*.

The final plant group that formed Mid Devonian forests are the lycopods. The forms that are known to form forests occur in the ever wet palaeo-equatorial areas such as northern China, Arctic Canada and Svalbard. These are represented by the microspore *Cymbosporites magnificus* and the megaspore *Verrucisporites submamillarius*. In Saudi Arabia these are represented by the *Cymbosporites catillus* morphon and *Verrucisporites yabrinensis*, the former having a late Givetian inception. In Western Australia, the closely related microspore is *Cymbosporites homiscoides* that also occurs in Western Gondwana (Bolivia). So, we can infer the migration of the tree sized lycopods as a somewhat different taxon along the northern margin of Gondwana passing through Saudi Arabia in the late Givetian. The Archaeopteridalean progymnosperms migrating in the opposite direction from Euramerica onto western Gondwana dispersing both eastwards to Arabia and southwards to southern South America.

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