Carboniferous floras of the provinces of Córdoba and Sevilla (Sierra Morena, SW Spain)

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The provinces of Córdoba and Sevilla (Sierra Morena, SW Spain) have yielded a varied record of Carboniferous floras that have been documented since the beginning of the 20th century. The oldest record, of late Tournaisian age, appears in the mainly marine succession found at Cerrón del Hornillo (Sevilla). Although this outcrop needs further sampling, the presence of the small-sized lycopsid *Lepidodendropsis* cf. *hirmeri* and progymnosperms such as *Neurocardiopteris broilii* and *Fryopsis frondosa* makes it one of the oldest Carboniferous floras in the Iberian Peninsula. Other Mississippian, late Tournaisian to early Visean, assemblages have been recorded in the province of Córdoba from the Valdeinfierno basin and at Benajarafe, a mostly volcanic succession with coal-bearing strata. Most characteristic taxa are *Triphyllopteris collombiana*, *Neurocardiopteris broilii*, *Rhodeopteridium stachei*, *Rhacopteris* spp., *Eoacanthocarpus feilitzschianus*, *Archaeocalamites scrobiculatus*, and *Sphenophyllum saxifragaefolioides*. Also Visean is the small flora containing *Neurocardiopteris broilii*, *"Lepidodendron" lossenii* and *Archaeocalamites* sp. that has been collected in marine strata near the chapel of Virgen de Linares, N of Córdoba city. Early Namurian (Serpukhovian) floras have been recorded in the Guadiato basin (Córdoba), in the same general area of Sierra Morena. The published list includes *Neuropteris antecedens*, *Lyginopteris* spp., *Diplotmema patentissimum*, *Senftenbergia aspera*, *Archaeocalamites scrobiculatus* and *"Lepidodendron" volkmannianum*; this shows a similar composition to those found in other European deposits of the same age. More complete and better documented plant assemblages are recorded for the Pennsylvanian. Langsettian-age floras (lower Westphalian) occur in the NW part of the strike-slip controlled basins of Peñarroya (Córdoba) and Villanueva del Río y Minas (Sevilla). In the well-sampled Peñarroya succession, the joint occurrence of *Karinopteris acuta* and *Neuralethopteris schlehanii,* together with ferns such as *Renaultia footneri* and *Renaultia rotundifolia,* indicates Langsettian. The presence of *Sigillaria minima*, whose range terminates in the middle Langsettian, constrains the age. Although less sampled, the Villanueva del Río flora is closely related to that of the Peñarroya. Early Bolsovian megafloras have been collected in the coal-bearing succession of the SE and central parts of the Peñarroya basin. Abundant taxa include *Laveineopteris tenuifolia*, *Paripteris linguaefolia*, *Mariopteris muricata, Bergeria dilatata* and *Sphenophyllum cuneifolium.* Although apparently less varied in pteridosperms, this flora is similar to those found in strata of the same age in the classic areas of the Paralic Coal Belt of north and central Europe. The most recent Carboniferous floras occur in the Valdeviar basin and several small outliers near Guadalcanal (Sevilla). The flora of the lower part of the Valdeviar succession, characterised by the presence of basalts and volcaniclastic deposits, contains a wide variety of ferns, e.g. *Renaultia lebachensis*, *Remia pinnatífida* and *Nemejcopteris feminaeformis*, pteridosperms such as *Neurodontopteris auriculata*, *Mixoneura gimmii* and *Odontopteris osmundaeformis*, and sphenopsids such as *Calamites multiramis*, *Annularia carinata*, *Annularia spicata* and *Annularia spinulosa*. The upper part of the succession, containing red beds, has yielded mainly conifers and peltasperms, thus

reflecting a more drought-prone climate. Finally, the Guadalcanal flora is noteworthy for the presence of a great variety of gingkoaleans, e.g. *Ginkgophyllum boureaui* and *Rhipidopsis baetica* as well as *Autunia conferta, Taeniopteris* and conifers.

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