



to the fossil record of total bivalve richness and to the records of different ecological guilds. Palaeoecological analyses of the Late Triassic crisis in SW UK have demonstrated that a significant bio-event took place during the latest Rhaetian. SCM data from the present study indicate that this event is unlikely to be an artefact of reduced fossil record completeness. The 'Pre-Planorbis Beds' of the lower Lias Group, however, witness a precipitous decline in the completeness of most bivalve guilds, and emigration of taxa due to localized marine anoxia is a likely cause. Neither variation in lithofacies, shell mineralogy, sedimentary rock outcrop area, nor sequence architecture can convincingly explain the observed patterns of completeness. Our SCM data reveal that the Early Jurassic fossil record of infaunal suspension-feeding bivalves is significantly poorer than that of epifaunal bivalves. Any differences in the apparent Rhaetian extinction rates between these two guilds should therefore be viewed with caution. Analyses of selectivity during the Late Triassic mass extinction based on global databases appear robust in light of our SCM data.

Aspidin – The Earliest Vertebrate Skeletal Tissue is Acellular Bone

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Aspidin, the hard tissue comprising the integument of the earliest skeletonising vertebrates, has been the subject of vigorous debate over its biology and homology for the last 60 years, having been identified as a form of dentine, cementum and cellular or acellular bone. Previous workers failed to reach consensus on the nature of structures present in the tissue or resolve aspidin's homologies, in part hindered by the limited technology of the day. We have revisited this debate and used new techniques to elucidate the true function of these structures, and use this to draw further conclusions about the placement of aspidin in the development of skeletonisation in the vertebrates. Etched histological specimens were investigated using SEM to examine and characterise aspidin in the main groups of heterostracans, with SRXTM imaging used to create a 3D model revealing the architecture of the heterostracan dermoskeleton. This has allowed us to conclude that the structures that typify aspidin include: a linked osteonal network, individual or woven bundles of unmineralised intrinsic fibres, and extrinsic fibres of attachment. This is consistent with aspidin being a form of acellular bone.

Sauropod forelimb flexibility deduced from deep manus tracks

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Sauropods are often considered to have very limited mobility and reduced limb flexibility, mainly due to their giant size and consequent weight. In the Upper Jurassic Lourinhã Formation, central-west Portugal, deep vertical natural casts of sauropod manus tracks are often preserved as the infills of the original tracks. These manus tracks are vertical-walled, with marks of the striations of the skin scales, showing that the movement of the sauropod



manus impacting and exiting the mud was totally vertical with no horizontal component of the stride. Some tracks are up to 66 cm deep, which is equivalent to the height of whole sauropod manus. This means that sauropods could lift their anterior feet in a complete vertical manner. Such movement is only possible if there is mobility at elbow and shoulder articulations in a higher degree than previously thought for sauropods. Our vision of sauropod limbs as inflexible columns has to be updated to a more dynamic model for limbs and body.

First record of the stegosaurian ichnogenus *Deltapodus* from the Upper Jurassic Morrison Formation, Utah, USA

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We describe the first American stegosaur track of the ichnogenus *Deltapodus brodricki* Whyte and Romano, collected in the Upper Jurassic Morrison Formation of San Juan County, southeastern Utah, USA. The track is preserved as a natural cast on the underside of a slab of fluvial sandstone, and consists of a well-preserved pes track and the eroded remains of a manus. The pes track is tridactyl, sub-triangular in outline, 31 cm long and 22 cm wide, mesaxonic and widest across the digits, which are short and blunt. *Deltapodus brodricki* was originally described from the Middle Jurassic floodplain deposits of the Yorkshire coast of England and later found in similar Upper Jurassic deposits of Portugal and Spain. Previous reports of stegosaur tracks from the Morrison Formation all differ significantly from the morphology of *Deltapodus*. The new discovery thus substantially extends the geographic record of this ichnogenus, and highlights the similarities between the Late Jurassic dinosaur faunas of North America and western Europe.

Silurian (late Sheinwoodian and Homerian) palaeocope ostracods from Arctic Canada

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A new silicified ostracod assemblage from Silurian (Wenlock) limestones and calcareous shales of the Cape Phillips Formation, Arctic Canada spans the interval of the late Sheinwoodian and Homerian, including the globally recognised Homerian regression. The

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ABSTRACTS

