New dinosaur and pterosaur tracksites from the Late Jurassic of Portugal  

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Portugal is rich on dinosaur remains (bones, eggs, and tracks) from Early Jurassic to Late Cretaceous ages, but mainly from the Late Jurassic, in which dozens of tracksites have been reported. Here we report new or poorly known track localities: 1) Five tracksites share the preservation substrate (marine carbonated limestone), age (Late Jurassic), geographic area (Leiria district of Portugal), kind of preservation (true tracks), and completeness (trackways of multiple individuals): (i) Praia dos Salgados includes eight trackways, mostly ornithopods and theropods, and one wide gauge sauropod, made in very soft sediment; some preserve the hallux impression. (ii) Serra de Mangues is mostly covered with vegetation but seems to include dozens of tracks comprising theropods, thyreophorans, ornithopods, and sauropods. (iii) Sobral da Lagoa (Pedreira do Rio Real) include six trackways but poorly preserved; (iv) Serra de Bouro that preserves four sauropod trackways in one single layer; (v) Pedrógão preserved, at least, one theropod trackway and several isolated tracks of theropods and ornithopods were found in different layers in the Early Oxfordian. 2) The locality in Praia de Porto das Barcas yielded natural casts of stegosaur tracks (including pes print with skin impression) and a very large sauropod pes print of about 1.2 m in length. 3) A new pterosaur tracksite was found in the Late Jurassic of Peralta, Lourinhã (Sobral Member, Lourinhã Fm.; Late Kimmeridgian/Early Tithonian). More than 220 manus and pes tracks have been collected in about five square meters, all ascribed to pterosaurs. The tracks were produced in a thin mud layer that has been covered by sand which preserved them as sandstone mould infill (natural casts). The manus of the largest specimens is 13 cm wide and 5.5 cm long and the pes measures 14.5 cm in length and 9 cm in width. This shows the occurrence of very large pterosaurs in the Late Jurassic. Other pterosaur tracksites in the Late Jurassic of Portugal are: Porto das Barcas (Lourinhã Municipality), South of Consolação (Peníche Municipality), and Zambujal de Baixo (Sesimbra Municipality).
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