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Palaeoenvironmental context of the vertebrate-bearing deposits of the Upper Triassic (Norian) sediments from Lipie śląskie (southern Poland)

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Fluvial sediments of the Keuper group from southern Poland comprise rich assemblage of terrestrial vertebrates. Fluvial environments favour various biological activities. One of this findings occurs in Lipie Śląskie (Upper Silesia region), where “Fossilagerstätten” are embedded in approximately 8 m thick succession of fluvial sandstones, siltstones and claystones. This section has been the subject of systematic sedimentological studies. The age of the bone-bearing deposits is still under debate but our detailed palynological studies suggest that sedimentation took place in Norian.

The entire section seems to be tripartite. The lowermost part is represented by variegated mudstones and claystones with distinct lamination. The middle part is represented by grey, trough-bedded, fine- to coarse-grained sandstones with dispersed plant remains, calcareous concretions and convolutions. These sediments pass gradually into dark argillaceous mudstones with distinct low-angle and ripple mark lamination, coalified plant debris and trunks. The mudstones are overlain by calcareous/dolomitic mudstones with pseudomorphoses of evaporates. The entire succession is capped by 5 m thick succession of Norian fresh-water limestone with cherts (so-called Woźniki Limestone).

Sedimentary characteristics of the lower part indicate deposition under arid conditions with occasional sheet-floods driven by torrential rains. Change in climatic conditions led to development of fluvial deposits of the succession. The middle part was formed in sand-loaded braided/meandering rivers deposits as channel, overbank and oxbow facies. Lack of bioturbation suggests permanent redeposition and migration of bedforms. In this part disarticulated bone fragments of various species of dicynodonts and theropods are enclosed mainly in lenticular calcareous nodules often covered by pyrite. Some concretions enclose imbricated coquinas of disarticulated bivalve shells which are almost absent in the adjacent sediments. This suggests an early diagenetic dissolution of the shells on one hand, and early origin of the concretions on the other hand. Development of pyrite and calcareous concretions corresponds to reduced conditions in groundwater solutions.

The studied sediments represent southern, marginal facies of the continental basin strongly influenced by climate changes between humid and dry conditions. Temporal humidification was probably related to periods of monsoonal circulation in the western Tethys realm.