Depositional setting of Permian and Triassic fossil plants in the Allan Hills, southern Victoria Land

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Sedimentology and paleobotany of Permian and Triassic rocks in the Allan Hills were examined during the 1989–1990 austral summer by a four-person field party from Ohio State University. Plant fossils were collected from the Permian Weller Coal Measures and Members B and C of the Triassic Lashly Formation. These strata were deposited in a variety of fluvial depositional settings, which included both braided and meandering stream environments.

The upper 70 meters of the Permian Weller Coal Measures are exposed in the Allan Hills and consist of interstratified sandstone, siltstone, mudstone, and coal. Fine- to medium-grained sandstone dominates in the lower part of the exposed section. Within these sandstones, the presence of large lateral-accretion surfaces suggests that deposition occurred on meandering-stream point bars. *Vertebraria sp.* occurs on the upper portion of some lateral accretion deposits. The location of these *in situ* roots indicates colonization of the upper point bar by glossopterids.

Near the top of the Weller, coarse-grained sandstone predominates. Deposition of these sandstones by braided streams is indicated by the following features:

- occurrence of internal horizontal bedding surfaces suggesting deposition from migrating bars,
- abundance of sandstone-filled abandoned channels suggesting a multi-channeled setting, and
- low paleocurrent dispersion suggesting deposition from low sinuosity streams.

Fossil plants in the Weller Coal Measures occur within fine-grain sequences associated with both meandering and braided stream sandstones. Fossils were collected as compressions and impressions from strata directly above and beneath coal seams, from mudstones contained within abandoned channels, and as silicified peat within coal seams.

Member B of the Triassic Lashly Formation is 54 to 70 meters thick and consists almost entirely of fine- to medium-grained, volcaniclastic sandstone. The following features suggest that this unit was deposited by sandy braided streams:

- large sandstone-filled channels indicating multiple channels,
- numerous internal scours suggesting discharge fluctuations,
- structures which suggest downstream migration of channel bars, and
- low dispersion of paleocurrents, indicating deposition from low-sinuosity streams.

Silicified peat and wood contained within Member B were collected on the upper surface of a 1-by-1.5 kilometer wide platform exposed along the eastern arm of Allan Hills. At this site, silicified peat occurs as blocks 0.2 and 0.5 meter thick and 0.1 to 3 meters in diameter. Peat blocks are scattered across two bedding plane surfaces and occur on the tops of dune-like structures within the sandstone. Logs as much as 8 meters in length also occur and are oriented sub-parallel to Triassic paleocurrent directions (north-northeast).

Peat, which typically develops in areas isolated from clastic influx (McCabe 1984), must have been eroded from areas of the alluvial plain where new channels were developing. These peat rafts were probably eroded and transported during floods. Deposition on the tops of sand bars and bed forms occurred during falling water stage (Gabites 1985). Alteration and devitrification of volcaniclastic rock fragments and volcanic glass (cf., Korsch 1974) probably served as the source of silica for silicification.

Fining-upward sequences within Member C of the Lashly Formation contain fine- to medium-grained sandstone, siltstone, mudstone, and coal. The occurrence of large lateral-accretion surfaces within sandstone bodies implies deposition from meandering streams. Plant fossils were collected from siltstone units and occur as impression/compressions containing preserved cuticles. The siltstones are finely laminated and were probably deposited from suspension within floodplain lakes.

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