

Implications of Paleozoic Flora and Fauna in the Northern Katanga Basin for Sedimentation and Mineralization in the Central African Copperbelt

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The Central African Copperbelt is the premier domain on the planet for sedimentary rock-hosted copper deposits. It comprises a series of mostly stratabound deposits, primarily hosted by the lower stratigraphic levels of the Neoproterozoic-Cambrian Katanga basin. Stratigraphic interpretation of these rocks has guided exploration for base metals in the Central African Copperbelt, as well as in age-correlative basins globally (e.g., the Adelaidean of Australia). The stratigraphic interpretation hinges on recognition of two laterally extensive glaciogene units that correspond to the Sturtian (~723–684 Ma) and Marinoan (~663–635 Ma) glaciations, respectively. Here we consider the significance of paleontological evidence from the host sequences to the mineral deposits of the northern Katanga basin.

Lufufke, Dikulushi, and Kapulo are low-tonnage, locally high grade arenite-hosted copper-silver deposits arranged inboard of the eastern margin of the basin. The standing stratigraphic framework recognizes two coarse-grained clastic units and correlates these with the Grand Conglomerat (Sturtian) and Petit Conglomerat (Marinoan) of the Central African Copperbelt in the southern Katanga Province. At Lufukwe, a distinctive pink dolomite (Lusele Member), visually similar to other post-Marinoan cap carbonates, overlies the upper clastic unit. On this basis, the host rocks to the mineral deposit at Lufukwe and Dikulushi have been interpreted to correlate with the Cryogenian interglacial Monwesi Sandstone and the Ediacaran Mongwe Sandstone, respectively. Farther north in the Kapulo area, a thinned stratigraphic package comprises three units: a basal litharkosic clastic package (Kapulo Member), a medial dolomite (Walinda Member), and an upper plateau-forming micaceous sandstone.

Samples of the Kanianga Member, a laminated dolomitic shale that concordantly overlies the Lusele Dolomite at Lufukwe, contain fossil flora including the problematic codiacean algae *Nuia sibirica* Maslov, as well as unclassified filamentous cyanobacteria microfossils. Stratigraphically overlying this, an oolitic grainstone of the Lubudi dolomite in the same area contains fragments of unclassified Brachiopoda, Bivalvia, and Echinoidea, and a fragment of an unclassified archeocyathid. In the Kapulo area, a peloidal limestone of the Walinda Member contains abundant skeletal fragments of similar Brachiopoda and Bivalvia, suggesting that it may be roughly correlated with the Kanianga-Lubudi members at Lufukwe.

Together, these assemblages constrain a depositional age for these rocks to the Upper Cambrian to Lower Ordovician, rather than Ediacaran, and therefore lengthen the period during which the Katanga basin has been thought to have accumulated sediment. Our observations do not unambiguously challenge the correlations of the glaciogene units in the northern Katanga basin, but if the upper clastic unit at Lufukwe is indeed a Marinoan deposit, then its paraconformable top marks an implausible 100 m.y. depositional hiatus. Instead, we prefer an interpretation whereby the coarse clastic units at Lufukwe belong to the Cambrian Varanger glaciation. In metallogenic terms, the Paleozoic fossils occur in strata lower than the host package at Dikulushi, and demonstrate that significant copper accumulation occurred higher in the sequence than has been appreciated. Qualitatively, we note several parallels between the

style of the mineral deposits at Dikulushi and Kipushi, and suggest that diapirism and mobile hydrocarbons may be critical elements involved in the later metallogeny of the basin.