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Diverse and dense trace fossil assemblages from the Ediacaran of Namibia

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The Ediacaran—Cambrian boundary records one of the most iconic and fundamental transitions in the history of life. It encompasses the change from the microbially-dominated world of the Proterozoic to the animal-dominated one of the Phanerozoic. Although research has traditionally focused on the Ediacaran macrofauna, it is the trace fossil record that constrains the evolution of early animal bodyplans, diversity, and behaviours. The latest Ediacaran strata of southern Namibia host a moderate diversity of trace fossil taxa, the majority of which record simple, horizontal locomotion traces. We report here the first association of the macrofossil Vendotaenia in direct association with treptichnid–like traces, recording direct co-occurrence between metazoan bioturbation and a classic Ediacaran taxon. Where bioturbation has been recorded in Ediacaran beds, it is typically not intense, and of low ichnodiversity. In contrast, a thin sandstone interbed near the base of the Spitskop Member (c. 543Ma) is densely bioturbated and hosts an assemblage of three distinct and disparate ichnogenera, including sediment bulldozing trace fossils, U-shaped burrows, and simple horizontal structures. The diversity and density of bioturbation in this bed is unprecedented for rocks of this age, and likely records colonisation in fully marine settings on the Spitskop carbonate ramp.