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The biostratigraphic conundrum of Siberia: Do true Tonian –Cryogenian microfossils occur in Mesoproterozoic rocks?

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13 **Abstract**

14 Abundant and diverse microfossils from shales of the ~1500-Ma-old Ust'-Il'ya
15 Formation in northern Siberia document early Mesoproterozoic life along the Siberian
16 Platform. Similar to many Meso- and Neoproterozoic microbiota, the Ust'-Il'ya assemblage
17 is dominated by cyanobacteria, both filamentous (oscillatorialeans and nostocaleans,
18 represented primarily by cellular trichomes and empty sheaths) and coccoidal
19 (chroococcaleans, including solitary and colonial specimens). Microbiotas from shallow-
20 water settings that contain morphologically simple and small microfossils were originally
21 taken to be representative of Mesoproterozoic life. However, the Ust'-Il'ya and other
22 compressed organic-walled microfossil assemblages in open shelf facies include diverse
23 microscopic eukaryotes: large (up to ~1-mm diameter) megasphaeromorph acritarchs,
24 branched filaments that are most likely of eukaryotic algae and other morphologically
25 complex microorganisms.

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