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Progressive genome evolution in Cyanobacteria

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Progressive evolution, the tendency towards increasing complexity, is a controversial issue in Biology, whose resolution requires the proper measurement of complexity. To address this challenge, we consider that genomes are the best entities to measure complexity because they record the history and information gain of organisms in their ongoing biotic and environmental interactions. By recurring to six metrics that measure genome complexity, which are not primarily associated to functionality, we report the existence of progressive evolution towards higher genome complexity in the evolution of the *Cyanobacteria* phylum. We show that these complexity metrics plus three additional genome parameters present statistically significant phylogenetic signal in Cyanobacteria. Moreover, a ridge regression of genome complexity metrics against evolutionary age shows that three out of six present a positively driven evolutionary trend towards higher complexity. These findings support the existence of progressive genome evolution in this ancient and diverse group of organisms.