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Abstract

Nature evolves biological molecules such as proteins through iterated rounds of diversification, selection, and amplification. The present invention provides methods, compositions, and systems for synthesizing, selecting, amplifying, and evolving non-natural molecules based on nucleic acid templates. The sequence of a nucleic acid template is used to direct the synthesis of non-natural molecules such as unnatural polymers and small molecules. Using this method combinatorial libraries of these molecules can be prepared and screened. Upon selection of a molecule, its encoding nucleic acid template may be amplified and/or evolved to yield the same molecule or related molecules for rescreening. The inventive methods and compositions of the present invention allow for the amplification and evolution of non-natural molecules in a manner analogous to the amplification of natural biopolymer such as polynucleotides and protein.

Fig. 1