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Nadrian C. Seeman* (ned.seeman@nyu.edu), Department of Chemistry, New York University, New York, NY 10003. *DNA is Not Merely the Secret of Life: Using the Chemical Information in DNA for the Construction of Objects, Lattices and Nanorobots.*

Synthetic DNA molecules can be designed that enable us to build branched DNA species. These are joined using sticky ends to produce N-connected objects and lattices. We have used ligation to construct DNA stick-polyhedra and topological targets, such as Borromean rings. We have constructed 2-dimensional DNA arrays with designed patterns from many different motifs. DNA arrays have been used to organize gold nanoparticles in specific arrangements in 2D and 3D. We have made a self-replicating 1D arrangement of DNA motifs. We have made robust sequence-dependent devices that change states by varied hybridization topology. Bipedal walkers, both clocked and autonomous have been built. We have constructed a molecular assembly line with three 2-state devices, so that there are eight different states represented by their arrangements. Recently, we have self-assembled a 3D crystalline array and have solved its crystal structure to 4 Å resolution, using unbiased crystallographic methods. We can use crystals with two molecules in the crystallographic repeat to control the color of the crystals. Thus, structural DNA nanotechnology has fulfilled its initial goal of controlling the structure of matter in three dimensions. A new era in nanoscale control awaits us. (Received December 26, 2011)