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Cover Three-dimensional structures of 144 of the 151 macromolecules from *E. coli* predicted to enable self-replication in vitro from 31 small-molecule substrates: RNAs (orange), DNA template strands (teal), DNA–mRNA strands (aquamarine), and proteins (pink). Aminoacyl-tRNA synthetases, tRNAs, and release factors are organized in the middle according to the standard genetic code grid. RNA and protein modification enzymes are positioned near their substrates. The system is drawn to scale with one turn of the DNA being 3.4 nm. Two kilobase pairs of the 113-kbp DNA genome are shown and all mRNAs are omitted. Homology models, when employed, are very rough. This and other in vitro synthetic biology projects are reviewed in Forster and Church, pp. 1–6. (Cover illustration by George Church.)