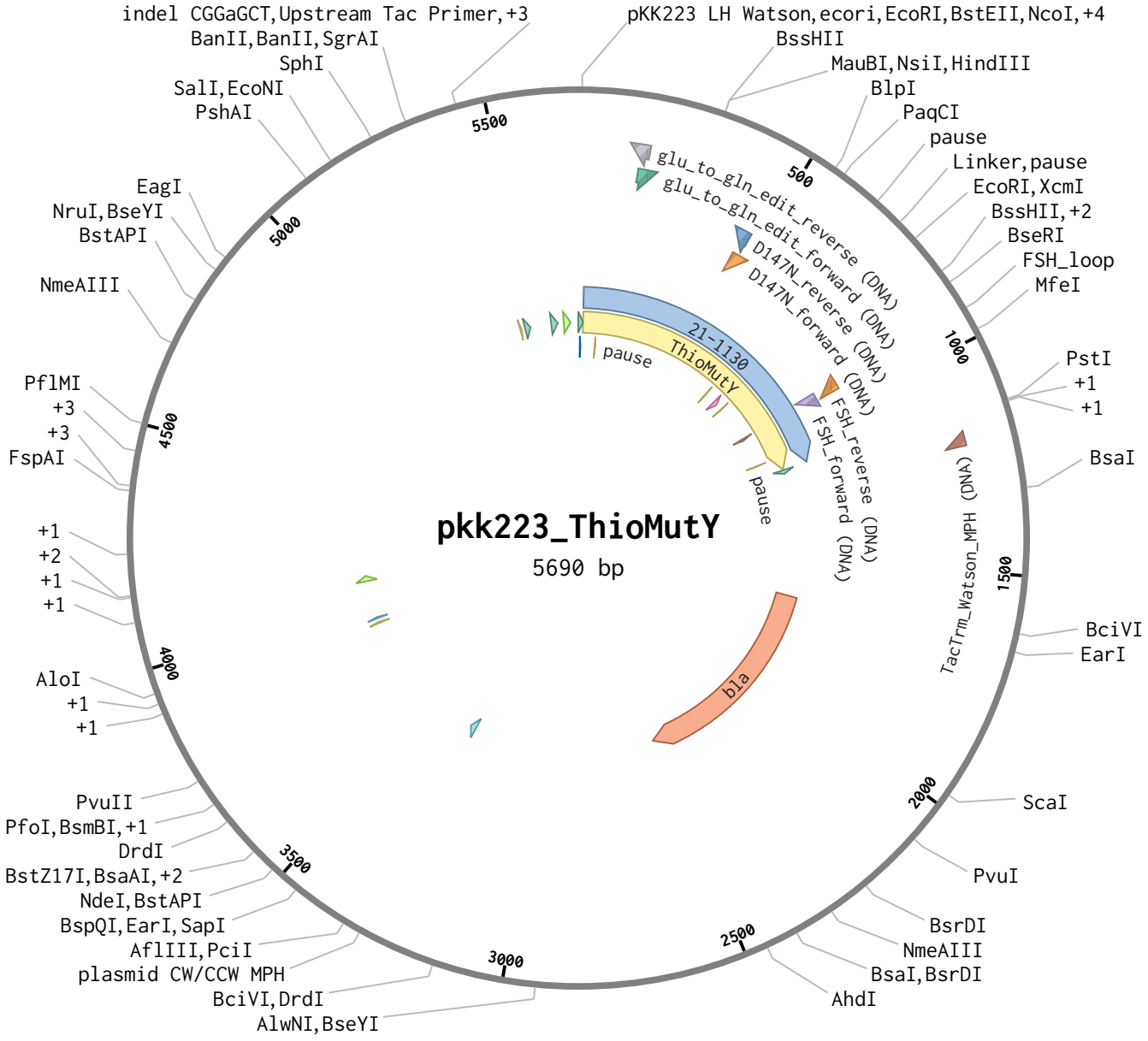pkk223_ThioMutY (5690 bp)