FIG S1. Results of iodine vapor staining of *E. coli* DH5α colonies growing on M9 minimal agar plates. a-f represent the six *E. coli* DH5α strains as annotated above. Based on the staining color, we divided the six strains into three groups arbitrarily. a and d belong to group 1 with light yellow-brownish color. b, c, and e are classified as group 2 with dark brownish color. f belongs to group 3 with dark blue color.
FIG S2. Comparison of reducing ends in four polysaccharides: amylose, amylopectin, oyster glycogen, and glycogen from full glgB knockout strain E. coli DH5α ΔglgB. Three replicates were performed for each sample.
FIG S3. Length distribution of bacterial GBEs. 1035 GBEs were selected from UniProt database under the name of “glycogen branching enzyme” or “1,4-alpha-glucan branching enzyme”. Each item was from a unique bacterial species while redundant or fragment sequences were removed manually or by nrdb90.pl. R was used to plot the histogram. Two major GBE groups can be identified in the figure, which shows consistent pattern with the result of Lo Leggio et al (53).
FIG S4. Cold stress (4°C) tolerance assay. Strains were sampled at days 3, 6, 10 and 13, with 3 replicates at each data point. Error bars are +/- 1 standard deviation.
### TABLE S1. Bacterial strains used in this study

| Bacterial Strain | Description | Sources       |
|------------------|-------------|---------------|
| *E. coli* DH5α  | Wild type   | Invitrogen    |
| *E. coli* DH5αΔglg90 | 90 bp deletion of glgB 5’ | This study |
| *E. coli* DH5α glgA180 | 180 bp deletion of glgB 5’ | This study |
| *E. coli* DH5α glgA270 | 270 bp deletion of glgB 5’ | This study |
| *E. coli* DH5α glgA369 | 369 bp deletion of glgB 5’ | This study |
| *E. coli* DH5α ΔglgB | Deletion of glgB | This study |
| *E. coli* BL21(DE3) | Wild type   | New England Biolabs |
| *E. coli* JM109 | Wild type   | New England Biolabs |
| *E. coli* DB3.1 | Wild type   | Invitrogen    |
| *E. coli* Top10 | Wild type   | Invitrogen    |
### TABLE S2A. List of primers used in this study

| Primer | 5’ – Primer Sequence – 3’ |
|-------|--------------------------|
| H1P1  | TTGGATGGGGTGACACAATAAAAACAGGAAGACAAGCGTGTAGGCTGGAGCTGCTTC |
| H2P2  | GTCGGGTAAAGGGCAGCGGACTTCCAGTCCCCGCGGTATATGATATATCCCTCCCTAGT |
| H2P3  | GACGCCCCTAAGAATCCCCGTGAGCTCAGACACTCCATATGAAATATCCTCCCTAGT |
| H2P4  | ACCAAAAAGTTAAGATATCATAATCAGGTTTTTGCTGATATGATATATCCTCCCTAGT |
| H2P5  | GACGCCATCCATAGTATCTGCAATCGCGCGCTAAGGTCATATGAAATATCCTCCCTAGT |
| H2P6  | GCCGAGGGGAGCGGTTGGCAATGGCGAGTTGTGCTGATATGAAATATCCTCCCTAGTT |
| K1    | CGGCCACAGTCGAATGAAATC |
| K2    | CGGTGCCCTGAAATGAACTGC |
| FPglgB| CAATAAAAACAGGAAGACAAGC |
| RPglgB| CCAATGGGCGATGTTGTGAT |
| glgBF | TCACCTACCAGCGACCATAAA |
| glgBR | GTCCTGTCTACACCAGCAAC |
| glgXF | CAACCATAAACACATGAAAGCAAC |
| glgXR | CAAGAAGACCGCTAAACCT |
| glgCF | ATCGTGTCCCTTGTATTCG |
| glgCR | TATCGTCTCCATTTGTGCCC |
| glgAF | GAAATGTGTTTTACTGTGC |
| glgAR | GAAAGAGATTGTGCGTGTAAT |
| glgPF | CTAGTAAACCTGGCGGATAAA |
| glgPR | GACCTGACAAACACACCTCA |
| cysGF | TTGGTACCGGCGGTGATGTGTC |
| cysGR | ATCGGGTGAACCTGGGATAAAGC |

### TABLE S2B. List of primer pairs for the respective glgB deletion mutant stains

| Strain          | Primer Pair |
|-----------------|-------------|
| E. coli DH5α glgBΔ90 | H1P1        |
| E. coli DH5α glgBΔ180 | H1P1        |
| E. coli DH5α glgBΔ270 | H1P1        |
| E. coli DH5α glgBΔ369 | H1P1        |
| E. coli DH5α ΔglgB   | H1P1        |
TABLE S3. Results of λ-max scanning (350 nm-750 nm) of glycogen-iodine solutions

| Glycogen Source         | λ-Max (nm) Replicate 1 | λ-Max (nm) Replicate 2 |
|-------------------------|------------------------|------------------------|
| *E. coli* DH5a          | 405                    | 405                    |
| *E. coli* DH5a glgΔ90   | 530                    | 530                    |
| *E. coli* DH5a glgΔ180  | 525                    | 530                    |
| *E. coli* DH5a glgΔ270  | 410                    | 395                    |
| *E. coli* DH5a glgΔ369  | 525                    | 530                    |
| *E. coli* DH5α ΔglgB    | 585                    | 585                    |