

Supplementary Table 6: GO profiling of all non-essential genes in fission yeast (A) and budding yeast (B)

| GO ID | GO term | Corrected <i>P</i> -value | Non-essential gene annotation | Total gene annotation |
|--|---|---------------------------|-------------------------------|-----------------------|
| A. Fission yeast | | | | |
| 1. Unknown | | | | |
| GO:0008150 | biological process | 1.50e-16 | 769 | 925 |
| 2. Biological regulation & protein modification | | | | |
| GO:0010468 | regulation of gene expression | 2.50 e-08 | 273 | 314 |
| GO:0009889 | regulation of biosynthetic process | 2.98e-08 | 276 | 318 |
| GO:0010556 | regulation of macromolecule biosynthetic process | 3.08e-08 | 272 | 313 |
| GO:0045449 | regulation of transcription | 6.52e-08 | 253 | 290 |
| GO:0051252 | regulation of RNA metabolic process | 6.52e-08 | 253 | 290 |
| GO:0060255 | regulation of macromolecule metabolic process | 2.38e-07 | 281 | 327 |
| GO:0006355 | regulation of transcription, DNA-dependent | 6.74e-07 | 242 | 279 |
| GO:0006479 | protein amino acid methylation | 7.89e-05 | 50 | 50 |
| GO:0019222 | regulation of metabolic process | 0.00052 | 321 | 391 |
| GO:0031323 | regulation of cellular metabolic process | 0.00096 | 317 | 387 |
| GO:0019219 | regulation of nucleobase, nucleoside, nucleotide and nucleic acid metabolic process | 0.0023 | 285 | 347 |
| GO:0043414 | biopolymer methylation | 0.0062 | 68 | 73 |
| GO:0007154 | cell communication | 0.0067 | 323 | 399 |
| 3. Stress response | | | | |
| GO:0050896 | response to stimulus | 3.69e-15 | 640 | 762 |
| GO:0033554 | cellular response to stress | 1.7e-13 | 482 | 564 |
| GO:0051716 | cellular response to stimulus | 6.77e-13 | 493 | 580 |
| GO:0006950 | response to stress | 2.3e-14 | 583 | 691 |
| GO:0042221 | response to chemical stimulus | 0.0043 | 142 | 164 |
| 4. Meiosis & reproduction | | | | |
| GO:0051321 | meiotic cell cycle | 4.66e-07 | 157 | 173 |
| GO:0007126 | meiosis | 1.26e-06 | 153 | 169 |

| | | | | |
|--|---------------------------------------|----------|-----|-----|
| GO:0051327 | M phase of meiotic cell cycle | 1.26e-06 | 153 | 169 |
| GO:0000003 | reproduction | 0.00052 | 179 | 208 |
| 5. Transmembrane transport | | | | |
| GO:0055085 | transmembrane transport | 0.00084 | 234 | 279 |
| | | | | |
| B. Budding yeast | | | | |
| 1. Biological regulation & protein modification | | | | |
| GO:0042221 | response to chemical stimulus | 4.92e-11 | 375 | 429 |
| GO:0042493 | response to drug | 2.72e-09 | 119 | 123 |
| GO:0050896 | response to stimulus | 3.55e-08 | 757 | 930 |
| 2. Meiosis & sexual reproduction | | | | |
| GO:0030435 | sporulation | 3.49e-06 | 144 | 157 |
| GO:0030447 | filamentous growth | 0.0002 | 96 | 103 |
| GO:0030154 | cell differentiation | 0.0003 | 160 | 181 |
| GO:0030476 | ascospore wall assembly | 0.0021 | 43 | 43 |
| GO:0019725 | cellular homeostasis | 0.0074 | 128 | 145 |
| GO:0030437 | ascospore formation | 0.0091 | 96 | 106 |
| 3. Cell wall organization | | | | |
| GO:0007047 | cell wall organization and biogenesis | 0.0005 | 203 | 235 |

The number of non-essential genes is 3,576 and the total gene number is 4,836. GO terms used to generate the data for **Fig. 2d** in the main text are unknown process (direct annotations to biological process GO:0008150); meiotic cell cycle (GO:0051321); response to stress (GO:0006950); transmembrane transport (GO:0055085); cell communication (this term includes annotations to the child term signal transduction) (GO:0007154); reg(ulation) of gene expression (GO:0010468). SGD had not used the process term transmembrane transport for all transmembrane transporters, and this figure was calculated for budding yeast using all genes annotated to the molecular function term ‘transmembrane transporter activity’ (GO: 0022857) merged with the orthologues of all fission yeast genes annotated to ‘transmembrane transport’.