

**Additional file 2** Gene Ontology annotations of the *A. niger* proteins

| Gene Ontology annotation                   | 2549            | 100%   |                     |        |
|--------------------------------------------|-----------------|--------|---------------------|--------|
| (a) Biological process                     | 1696            | 66.54% |                     |        |
| Categories and subcategories               | Number of genes |        | % to total in group |        |
| Metabolism                                 | 1282            | 75.59% |                     |        |
| protein metabolism                         | 441             | 34.40% |                     |        |
| protein biosynthesis                       |                 |        | 192                 | 43.54% |
| protein modification                       |                 |        | 116                 | 26.30% |
| protein catabolism                         |                 |        | 90                  | 20.41% |
| protein folding                            |                 |        | 28                  | 6.35%  |
| protein targeting                          |                 |        | 23                  | 5.22%  |
| glycoprotein metabolism                    |                 |        | 13                  | 2.95%  |
| protein complex assembly                   |                 |        | 8                   | 1.81%  |
| other                                      |                 |        | 5                   | 1.13%  |
| biosynthesis                               | 365             | 28.47% |                     |        |
| macromolecule biosynthesis                 |                 |        | 273                 | 74.79% |
| protein biosynthesis                       |                 |        | 192                 | 54.70% |
| amine biosynthesis                         |                 |        | 52                  | 14.25% |
| coenzyme and prosthetic group biosynthesis |                 |        | 28                  | 7.67%  |
| vitamin biosynthesis                       |                 |        | 15                  | 4.11%  |
| aromatic compound biosynthesis             |                 |        | 9                   | 2.47%  |
| organic acid biosynthesis                  |                 |        | 8                   | 2.19%  |
| alcohol biosynthesis                       |                 |        | 7                   | 1.92%  |
| antibiotic biosynthesis                    |                 |        | 5                   | 1.37%  |
| other                                      |                 |        | 16                  | 4.40%  |
| nucleotide and nucleic acid metabolism     | 330             | 25.74% |                     |        |
| transcription                              |                 |        | 156                 | 47.27% |
| RNA metabolism                             |                 |        | 72                  | 21.82% |
| DNA metabolism                             |                 |        | 67                  | 20.30% |
| nucleotide metabolism                      |                 |        | 35                  | 10.61% |
| nucleobase metabolism                      |                 |        | 6                   | 1.82%  |
| gene silencing                             |                 |        | 4                   | 1.21%  |
| nucleoside metabolism                      |                 |        | 4                   | 1.21%  |
| other                                      |                 |        | 8                   | 1.60%  |
| carbohydrate metabolism                    | 159             | 12.40% |                     |        |
| catabolism                                 | 138             | 10.76% |                     |        |
| macromolecule catabolism                   |                 |        | 92                  | 66.67% |
| carbohydrate catabolism                    |                 |        | 29                  | 21.01% |
| alcohol catabolism                         |                 |        | 22                  | 15.94% |
| amine catabolism                           |                 |        | 7                   | 5.07%  |
| lipid catabolism                           |                 |        | 6                   | 4.35%  |
| cell wall catabolism                       |                 |        | 3                   | 2.17%  |
| aromatic compound catabolism               |                 |        | 2                   | 1.45%  |
| other                                      |                 |        | 4                   | 2.88%  |
| organic acid metabolism                    | 136             | 10.61% |                     |        |
| electron transport                         | 119             | 9.28%  |                     |        |
| amine metabolism                           | 114             | 8.89%  |                     |        |
| amino acid and derivative metabolism       | 113             | 8.81%  |                     |        |

|                                    |     |        |                                  |            |
|------------------------------------|-----|--------|----------------------------------|------------|
| phosphorus metabolism              | 92  | 7.18%  |                                  |            |
| energy pathways                    | 55  | 4.29%  |                                  |            |
| lipid metabolism                   | 50  | 3.90%  |                                  |            |
| alcohol metabolism                 | 47  | 3.67%  |                                  |            |
| coenzyme and prosthetic group      | 38  | 2.96%  |                                  |            |
| aromatic compound metabolism       | 34  | 2.65%  |                                  |            |
| nitrogen metabolism                | 25  | 1.95%  |                                  |            |
| oxidative phosphorylation          | 21  | 1.64%  |                                  |            |
| vitamin metabolism                 | 20  | 1.56%  |                                  |            |
| heterocycle metabolism             | 19  | 1.48%  |                                  |            |
| sulfur metabolism                  | 16  | 1.25%  |                                  |            |
| oxygen and reactive oxygen species | 13  | 1.01%  |                                  |            |
| other                              | 30  | 2.35%  |                                  |            |
| cellular physiological process     | 512 | 30.19% |                                  |            |
| cell growth and/or maintenance     | 499 | 97.46% |                                  |            |
|                                    |     |        | transport                        | 351 70.34% |
|                                    |     |        | cell organization and biogenesis | 93 18.64%  |
|                                    |     |        | cell proliferation               | 69 13.83%  |
|                                    |     |        | cell homeostasis                 | 11 2.20%   |
|                                    |     |        | other                            | 12 2.40%   |
| cell death                         | 12  | 2.34%  |                                  |            |
| sporulation                        | 7   | 1.37%  |                                  |            |
| other                              | 5   | 0.99%  |                                  |            |
| response to stimulus               | 51  | 3.00%  |                                  |            |
| secretion                          | 5   | 0.29%  |                                  |            |

(b) Cellular component 1195 46.88%

| Categories and subcategories |      | Number of genes       | % to total in group |        |
|------------------------------|------|-----------------------|---------------------|--------|
| cell                         | 1172 |                       | 98.08%              |        |
| intracellular                | 787  |                       | 67.15%              |        |
| cytoplasm                    |      | 473                   | 60.10%              |        |
|                              |      | mitochondrion         | 103                 | 21.78% |
|                              |      | ribosome              | 98                  | 20.72% |
|                              |      | endoplasmic reticulum | 52                  | 10.99% |
|                              |      | cytoskeleton          | 45                  | 9.51%  |
|                              |      | cytosol               | 29                  | 6.13%  |
|                              |      | Golgi apparatus       | 19                  | 4.02%  |
|                              |      | vacuole               | 16                  | 3.38%  |
|                              |      | cytoplasmic vesicle   | 15                  | 3.17%  |
|                              |      | membrane coat         | 12                  | 2.54%  |
|                              |      | microbody             | 12                  | 2.54%  |
|                              |      | other                 | 22                  | 4.62%  |
| nucleus                      |      | 296                   | 37.61%              |        |
|                              |      | nucleolus             | 18                  | 6.08%  |
|                              |      | nucleoplasm           | 12                  | 4.05%  |
|                              |      | proteasome complex    | 9                   | 3.04%  |
|                              |      | nuclear membrane      | 8                   | 2.70%  |
|                              |      | other                 | 4                   | 1.36%  |
| cell cortex                  |      | 9                     | 1.14%               |        |

|               |                        |        |        |
|---------------|------------------------|--------|--------|
|               | chromosome             | 9      | 1.14%  |
|               | other                  | 7      | 0.89%  |
| membrane      | 483                    | 41.21% |        |
|               | integral to membrane   | 257    | 53.21% |
|               | inner membrane         | 34     | 7.04%  |
|               | mitochondrial membrane | 34     | 7.04%  |
|               | plasma membrane        | 26     | 5.38%  |
|               | endomembrane system    | 19     | 3.93%  |
|               | outer membrane         | 9      | 1.86%  |
|               | vacuolar membrane      | 7      | 1.45%  |
|               | other                  | 7      | 1.45%  |
| extracellular | 15                     | 1.26%  |        |
| Unlocalized   | 10                     | 0.84%  |        |

(c) Molecular function 1691 66.34%

| Categories and subcategories |                                | Number of genes | % to total in group |  |
|------------------------------|--------------------------------|-----------------|---------------------|--|
| catalytic activity           | 1059                           | 62.63%          |                     |  |
|                              | hydrolase activity             | 339             | 32.01%              |  |
|                              | oxidoreductase activity        | 274             | 25.87%              |  |
|                              | transferase activity           | 261             | 24.65%              |  |
|                              | kinase activity                | 115             | 10.86%              |  |
|                              | ligase activity                | 67              | 6.33%               |  |
|                              | lyase activity                 | 66              | 6.23%               |  |
|                              | helicase activity              | 36              | 3.40%               |  |
|                              | isomerase activity             | 29              | 2.74%               |  |
|                              | other                          | 8               | 1.13                |  |
| binding                      | 707                            | 41.81%          |                     |  |
|                              | nucleotide binding             | 319             | 45.12%              |  |
|                              | nucleic acid binding           | 203             | 28.71%              |  |
|                              | metal ion binding              | 186             | 26.31%              |  |
|                              | protein binding                | 32              | 4.53%               |  |
|                              | cofactor binding               | 28              | 3.96%               |  |
|                              | lipid binding                  | 6               | 0.85%               |  |
|                              | amino acid binding             | 5               | 0.71%               |  |
|                              | other                          | 11              | 1.54%               |  |
| transporter                  | 262                            | 15.49%          |                     |  |
|                              | amine/polyamine transporter    | 147             | 56.11%              |  |
|                              | carbohydrate transporter       | 79              | 30.15%              |  |
|                              | carrier                        | 44              | 16.79%              |  |
|                              | channel/pore class transporter | 35              | 13.36%              |  |
|                              | drug transporter               | 25              | 9.54%               |  |
|                              | electron transporter           | 19              | 7.25%               |  |

|                         |                                         |       |       |
|-------------------------|-----------------------------------------|-------|-------|
|                         | intracellular transporter               | 19    | 7.25% |
|                         | ion transporter                         | 9     | 3.44% |
|                         | lipid transporter                       | 8     | 3.05% |
|                         | nucleotide and nucleic acid transporter | 7     | 2.67% |
|                         | other                                   | 12    | 4.57% |
| transcription regulator | 78                                      | 4.61% |       |
| structural molecule     | 35                                      | 2.07% |       |
| translation regulator   | 30                                      | 1.77% |       |
| signal transducer       | 25                                      | 1.48% |       |
| chaperone               | 18                                      | 1.06% |       |
| enzyme regulator        | 11                                      | 0.65% |       |
| antioxidant             | 8                                       | 0.47% |       |
| motor                   | 3                                       | 0.18% |       |
| nutrient reservoir      | 3                                       | 0.18% |       |

(a) 1696 unigenes generated 1850 multiple mappings. Percentage representation is based on 1696. (b) 1195 unigenes generated 1197 multiple mappings. Percentage representation is based on 1195. (c) 1691 unigenes generated 2239 multiple mappings. Percentage representation is based on 1691.