**Table S3** Characteristics of the pathways identified in DhaA crystal structures using the probe radius of 0.8 Å

| | PDB-ID 1BN6[a] | | | PDB-ID 1BN7[a] | | | PDB-ID 1CQW[a] | | |
|---|---|---|---|---|---|---|---|---|---|
| **Rank** | **Pathway** | **Bottleneck radius [Å]** | **Average Throughput** | **Pathway** | **Bottleneck radius [Å]** | **Average Throughput** | **Pathway** | **Bottleneck radius [Å]** | **Average Throughput** |
| 1 | p1 | 1.5 | 0.713 | p1a | 1.2 | 0.722 | p1a | 1.6 | 0.709 |
| 2 | p2a | 1.4 | 0.607 | p2ab | 0.9 | 0.500 | p2ab | 1.0 | 0.492 |
| 3 | p2b | 1.1 | 0.602 | p1b | 0.8 | 0.422 | p1a' | 0.9 | 0.422 |
| 4 | - | 0.9 | 0.301 | - | 0.8 | 0.325 | - | 0.9 | 0.272 |
| 5 | - | 0.8 | 0.221 | - | 0.9 | 0.265 | p3 | 0.8 | 0.241 |
| 6 | - | 0.8 | 0.125 | p3 | 0.9 | 0.236 | - | 0.8 | 0.099 |
| 7 | - | 0.9 | 0.100 | - | 0.8 | 0.216 | - | 0.9 | 0.083 |
| 8 | - | 0.9 | 0.090 | - | 0.8 | 0.097 | - | 0.8 | 0.032 |
| 9 | - | 0.8 | 0.042 | - | 0.8 | 0.091 | - | 0.8 | 0.028 |
| 10 | - | 0.8 | 0.038 | - | 0.8 | 0.085 | - | 0.8 | 0.018 |
| 11 | - | 0.8 | 0.030 | - | 0.8 | 0.051 | - | 0.8 | 0.005 |
| 12 | - | 0.8 | 0.026 | - | 0.8 | 0.036 | n.a.[b] | - | - |
| 13 | - | 0.8 | 0.004 | - | 0.8 | 0.034 | n.a.[b] | - | - |
| 14 | - | 0.8 | 0.0004 | n.a.[b] | - | - | n.a.[b] | - | - |

[a]DhaA crystal structures with introduced substitutions V172A, I209L and G292A (see Protocol S4), without hydrogen atoms; [b]pathway not identified (n.a. - not applicable).