

Additional file 4. Alignment of cyclic nucleotide binding protein candidates with known CNB domains

Representative CNB domains were downloaded from Interpro [IPR000595]. Where the protein has tandem CNB domains these are indicated by the letters “a” and “b”. The number in parenthesis indicates the number of amino acids that have been omitted. The * indicates conserved amino acids across species. The tyrosine residues that have been circled are sites of Y-nitration. Human – *H. sapiens* (Hs): PKA I α [EMBL:P10644], PKA I β [EMBL:P31321], PKA II α [EMBL:A8KAH7], PKA II β [EMBL:P31323], PKG I [EMBL:Q13976], PKG II [EMBL:Q13237], HCN 1 [EMBL:O60741], HCN 2 [EMBL:Q9UL51], HCN 3 [EMBL:Q9P1Z3], HCN 4 [EMBL:Q9Y3Q4], CNG α -1 [EMBL:P29973], CNG α -3 [EMBL:Q16281], CNG α -4 [EMBL:Q8IV77], CNG β -1 [EMBL:Q14028], CNG β -3 [EMBL:Q9NQW8], CNG olfactory (olf) [EMBL:Q16280], K⁺ voltage gated channel (K volt) H1 [EMBL:O95259], K volt H2 [EMBL:Q708S9], K volt H3 [EMBL:Q9ULD8], K volt H4 [EMBL:Q9UQ05], K volt H5 [EMBL:Q8NCM2], K volt H6 [EMBL:Q9H252], K volt H7 [EMBL:Q9NS40], K volt H8 [EMBL:Q96L42], Epac1 [EMBL:O95398], Epac2 [EMBL:Q8WZA2], RAPGEF 2 [EMBL:Q9Y4G8] and RAPGEF 6 [EMBL:Q8TEU7]. Mouse - *Mus musculus* (Mm): PKA I α [EMBL:Q9DBC7], PKA I β [EMBL:P12849], PKA II α [EMBL:Q8K1M3], PKA II β [EMBL:P31324], PKG I [EMBL:POC605], PKG II [EMBL:Q61410], HCN 1 [EMBL:O88704], HCN 2 [EMBL:O88703], HCN 3 [EMBL:O88705], HCN 4 [EMBL:B2RY58], CNG α -1 [EMBL:P29974], CNG α -3 [EMBL:Q9JJZ8], CNG α -4 [EMBL:Q3UW12], CNG β -3 [EMBL:Q9JJZ9], CNG olf [EMBL:Q62398], K volt H1 [EMBL:Q60603], K volt H5 [EMBL:Q920E3], K volt H6 [EMBL:Q32ME0], K volt H8 [EMBL:P59111], RAPGEF 3 [EMBL:Q8VCC8] and RAPGEF 4 [EMBL:Q9EQZ6]. Chicken - *Gallus gallus* (Gg): PKA I α [EMBL:E1BRS5], PKA I β [EMBL:E1C2U6], PKA II α [EMBL:E1C9H8], PKG II [EMBL:E1C4W9], CNG cone [EMBL:Q90805], CNG rod [EMBL:Q90980], K volt H5 [EMBL:E1BXX7] and RAPGEF 2 [EMBL:E1BVM2]. Frog - *Xenopus laevis* (Xl): PKA I α [EMBL:Q6INK7], PKA I β [EMBL:Q6DJJ2], PKA II β [EMBL:Q6NTM8], PKG II [EMBL:Q6GPV8], RAPGEF 3 [EMBL:Q56TX1] and RAPGEF 2 [EMBL:Q6AX68]. Fish - *Danio rerio* (Dr): PKA I α [EMBL:Q510F6], PKA I β [EMBL:Q08C49], PKA II α [EMBL:Q6NW93], PKG I [EMBL:Q7T2E5], PKG II [EMBL:A2AVJ3], HCN 1 [EMBL:E7F8B3], HCN 2 [EMBL:F1QYP7], HCN 4 [EMBL:Q1L917], CNG α -3 [EMBL:E7F485], CNG α -4 [EMBL:F1Q5G4], CNG β -1 [EMBL:F1QK35], CNG β -3 [EMBL:E7F818], CNG olf [EMBL:Q0GFG2], CNG rod [EMBL:E7FE78], K volt H1 [EMBL:Q108P3], K volt H2 [EMBL:Q8JH78], K volt H4 [EMBL:E7FB36], K volt H5 [EMBL:Q5TYT4], K volt H7 [EMBL:E7F7K8], K volt H8 [EMBL:F1QTV6], RAPGEF 4 [EMBL:B0S4Y8] and RAPGEF 2 [EMBL:E9QI83]. Fly - *Drosophila melanogaster* (Dm): Dm 1 [EMBL:Q03042], Dm 2 [EMBL:Q9W201], Dm 3 [EMBL:A1Z9N7], Dm 4 [EMBL:Q9VL34], Dm 5 [EMBL:Q03043], Dm 6 [EMBL:Q9VJE6], Dm 7 [EMBL:Q2MGL9], Dm 8 [EMBL:Q7JPB9], Dm 9 [EMBL:P16905], Dm 10 [EMBL:Q9W2D5], Dm 11 [EMBL:Q9VXV8], Dm 12 [EMBL:Q24278], Dm 13 [EMBL:Q9VXJ8], Dm 14 [EMBL:Q02280], Dm15 [EMBL:Q9VGW3], Dm 16 [EMBL:Q8T4B9], Dm 17 [EMBL:E1JJF4], Dm 18 [EMBL:Q9VMF3], Dm 19 [EMBL:A1Z6P8], Dm 20 [EMBL:C7LA62], Dm 21 [EMBL:A8Y516] and Dm 22 [EMBL:P81900]. Worm - *Caenorhabditis elegans* (Ce): Ce 1 [EMBL:P30625], Ce 2 [EMBL:P90975], Ce 3 [EMBL:Q9N4C1], Ce 4 [EMBL:O61827], Ce 5 [EMBL:G5EDB9], Ce 6 [EMBL:A8WI01], Ce 7 [EMBL:Q03611], Ce 8 [EMBL:G5EE47], Ce 9 [EMBL:O44164], Ce 10 [EMBL:Q7Z205], Ce 11 [EMBL:O76360], Ce 12 [EMBL:H2KYN2], Ce 13 [EMBL:P34578], Ce 14 [EMBL:Q02331] and Ce 15 [EMBL:Q21534]. Slime mold - *Dictyostelium discoideum* (Dd): PKA [EMBL:P05987],

GbpA [EMBL:Q8MLZ3], GbpB [EMBL:Q8MM62], GbpC [EMBL:Q8MVR1] and GbpD [EMBL:Q54S40]. Protozoa - *Paramecium tetraurelia* (Pt): Pt 1 [EMBL:A0EIQ4], Pt 2 [EMBL:A0E8R0], Pt 3 [EMBL:Q3SEN1], Pt 4 [EMBL:A0CMH6], Pt 5 [EMBL:A0E7L3], Pt 6 [EMBL:A0BXC3], Pt 7 [EMBL:A0DN90], Pt 8 [EMBL:A0EB61], Pt 9 [EMBL:A0CP78], Pt 10 [EMBL:A0BEU4], Pt 11 [EMBL:A0BTC2], Pt 12 [EMBL:A0D1E5], Pt 13 [EMBL:A0BVR3], Pt 14 [EMBL:A0CW70] and Pt 15 [EMBL:A0CSD1]. Yeast - *Saccharomyces cerevisiae* (Sc): Sc 1 [EMBL:A6ZM06], Sc 2 [EMBL:A6ZVN6] and Sc 3 [EMBL:A6ZUD9]. Bacteria – *E. coli* (Ec): CAP [EMBL:P0ACJ8], Ec 1 [EMBL:P0A9E9] and Ec 2 [EMBL:P0A9E5]. Cyanobacteria – *Synechococcus* sp. JA-2-3B'a[2-13] (Syn): Syn 1 [EMBL:Q2JH72], Syn 2 [EMBL:Q2JKW7], Syn 3 [EMBL:Q2JLI3], Syn 4 [EMBL:Q2JIT2] and Syn 5 [EMBL:Q2JJK4]. Algae - *Chlamydomonas reinhardtii* (Cr): Cr 1 [EMBL:A8IYM3], Cr 2 [EMBL:A8IYN1], Cr 3 [EMBL:A8I6P0], Cr 4 [EMBL:A8HZS1], Cr 5 [EMBL:A8JDQ7], Cr 6 [EMBL:A8IXU5], Cr 7 [EMBL:A8J8T7], Cr 8 [EMBL:Q695H0], Cr 9 [EMBL:A8J0U9], Cr 10 [EMBL:A8JCV1], Cr 11 [EMBL:A8IH98], Cr 12 [EMBL:A8HX98] and Cr 13 [EMBL:A8J7I2]. Moss - *Physcomitrella patens*: moss 1 [EMBL:A5PH36], moss 2 [EMBL:A5PH37], moss 3 [EMBL:Q7XB48], moss 4 [EMBL:A9RTB2], moss 5 [EMBL:A9SD47], moss 6 [EMBL:A9SHM8], moss 7 [EMBL:A9SIB5], moss 8 [EMBL:D2U576], moss 9 [EMBL:A9T9L8], moss 10 [EMBL:A9T8G5], moss 11 [EMBL:A9SDJ9], moss 12 [EMBL:A9SNU5], moss 13 [EMBL:A9TTE5] and moss 14 [EMBL:A9TV43]. *A. thaliana* (At): CNGC1 [EMBL: O65717], CNGC2 [EMBL: O65718], CNGC3 [EMBL: Q9SKD7], CNGC4 [EMBL: Q94AS9], CNGC5 [EMBL: Q8RWS9], CNGC6 [EMBL: O82226], CNGC7 [EMBL: F4I2R9], CNGC8 [EMBL: Q9FXH6], CNGC9 [EMBL: Q9M0A4], CNGC10 [EMBL: Q9LNJ0-2], CNGC11 [EMBL: Q9SKD6], CNGC12 [EMBL: Q8GWD2], CNGC13 [EMBL: Q9LD40], CNGC14 [EMBL: Q9SJA4], CNGC15 [EMBL: Q9SL29], CNGC16 [EMBL: Q9SU64], CNGC17 [EMBL: Q8L7Z0], CNGC18 [EMBL: Q9LEQ3], CNGC19 [EMBL: Q9LDR2], CNGC20 [EMBL: Q9LD37], KT1 [EMBL:Q38998], KT2/3 [EMBL:Q38898], KT5 [EMBL:Q9SCX5], SPIK [EMBL:Q8GXE6], GORK [EMBL:Q94A76], SKOR [EMBL:Q9M8S6], KAT1 [EMBL:Q39128], KAT2 [EMBL:Q38849], KAT3 [EMBL:P92960], SOS1 [EMBL:Q9LKW9], PP2C [EMBL:Q9SL76], palmitoyl CoA hydrolase (Pal CoA Hyd) [EMBL:F4HU51] and acyl CoA thioesterase (Acyl CoA Th) [EMBL:Q5FYU1]. Rice - *Oryza sativa*: rice 1 [EMBL:B9FTK2], rice 2 [EMBL:B9F4U7], rice 3 [EMBL:B9FTK3], rice 4 [EMBL:Q9AUV9], rice 5 [EMBL:Q60EI8], rice 6 [EMBL:Q5ZAU3], rice 7 [EMBL:Q2QRA3], rice 8 [EMBL:Q10G24], rice 9 [EMBL:Q7X641], rice 10 [EMBL:B9F3N3], rice 11 [EMBL:B9FRX2], rice 12 [EMBL:Q6ZG24], rice 13 [EMBL:Q0IPW9], rice 14 [EMBL:Q653S0], rice 15 [EMBL:Q6K6P3], rice 16 [EMBL:A3B9H5], rice 17 [EMBL:B9F3H5], rice 18 [EMBL:Q0JKV1], rice 19 [EMBL:B9FVS3], rice 20 [EMBL:A2ZX97], rice 21 [EMBL:Q75HP9], rice 22 [EMBL:Q7XUW4], rice 23 [EMBL:Q653P0], rice 24 [EMBL:Q5QNI1], rice 25 [EMBL:Q5JM04], rice 26 [EMBL:Q6K3T2], rice 27 [EMBL:Q0ILJ6], rice 28 [EMBL:Q7XPS0] and rice 29 [EMBL:Q6K3D4].