

Supplementary information

The following sequences were used in the different phylogenies.

(*Homo sapiens*: *H. sapiens*, *Macaca mulatta*: *M. mulatta*, *Rattus norvegicus*: *R. norvegicus*, *Mus musculus*: *M. musculus*, *Bos taurus*: *B. taurus*, *Monodelphis domestica*: *M. domestica*, *Gallus gallus*: *G. gallus*, *Xenopus tropicalis*: *X. tropicalis*, *Danio rerio*: *D. rerio*, *Branchiostoma floridae*: *B. floridae*, *Drosophila melanogaster*: *D. melanogaster*, *Caenorhabditis elegans*: *C. elegans*, *Saccharomyces cerevisiae*: *S. cerevisiae*, *Monosiga brevicollis*: *M. brevicollis*, *Zea mays*: *Z. mays*, and *Chlamydomonas reinhardtii*: *C. reinhardtii*).

AADC

Homo sapiens AADC_HS NP_000781.1

Macaca mulatta AADC_mam XP_001082132.1

Rattus norvegicus AADC_RN NP_036677.1

Mus musculus AADC_mum NP_057881.1

Bos taurus AADC_BT NP_776332.1

Monodelphis domestica AADC_MD XP_001379620.2

Gallus gallus AADC_GG XP_419032.3

Xenopus tropicalis AADC_XT NP_001011289.1

Danio rerio AADC_DR NP_998507.1

Branchiostoma floridae Hyp1_BF XP_002588857.1

Branchiostoma floridae Hyp2_BF XP_002586977.1

Branchiostoma floridae Hyp3_BF XP_002588644.1

Drosophila melanogaster DDC_DM NP_724164.1

Drosophila melanogaster TDC2_DM NP_724489.1

Bos taurus HDC_BT NP_001019722.1

Monodelphis domestica HDC_MD XP_001380521.1

Rattus norvegicus HDC_RN NP_058712.2

Homo sapiens HDC_HS NP_002103.2
Macaca mulatta HDC_mam XP_001114184.1
Mus musculus HDC_mum NP_032256.3
Gallus gallus HDC_GG XP_413833.1
Branchiostoma floridae Hyp4_BF XP_002597913.1
Drosophila melanogaster HDC_DM NP_523679.2
Xenopus tropicalis HDCL_XT XP_002939672.1
Drosophila melanogaster AMDR_DM NP_476592.1
Drosophila melanogaster TDC1_DM NP_610226.2
Danio rerio HDC_DR NP_001096063.1
Macaca mulatta HDC2_mam XP_002804814.1
Chlamydomonas reinhardtii AADC_CR XP_001690025.1
Zea mays Hyp1_ZM NP_001169175.1
Zea mays Hyp2_ZM NP_001146372.1
Zea mays HYP3_ZM NP_001152297.1
Zea mays Hyp3_ZM NP_001142212.1
Zea mays T/DDC1_ZM NP_001147982.1
Caenorhabditis elegans TDC-1_CE NP_495744.1
Caenorhabditis elegans BAS-1_CE NP_001021150.1
Caenorhabditis elegans BASL-1_CE NP_498210.1
Caenorhabditis elegans HDL-1_CE NP_502265.2

AANAT

Homo sapiens SNAT NP_001079.1
Macaca mulatta SNAT NP_001040592.1
Mus musculus SNAT NP_033721.1

Bos taurus SNAT NP_803475.1
Bos taurus AANAT_L XP_876019.2
Monodelphis domestica SNAT_L XP_001377164.2
Xenopus tropicalis SNAT_L XP_002935979.1
Gallus gallus SNAT NP_990489.1
Danio rerio SNAT NP_956998.1
Danio rerio aanat NP_571486.1

ASMT

Homo sapiens HIMT NP_004034.2
Macaca mulatta HIMT NP_001028112.1
Gallus gallus HIMT NP_990674.1
Bos taurus HIMT NP_803459.1
Danio rerio ASMT NP_001103947.1
Danio rerio HIMT NP_001108381.1
Rattus norvegicus ASMT NP_653360.2
Mus musculus ASMT NP_001186141.1
Xenopus tropicalis ASMT NP_001011409.1
Homo sapiens ASMT_L NP_004183.2
Monodelphis domestica ASMT_L XP_001364243.1
Monodelphis domestica HIMT_L XP_001363839.2
Danio rerio ASMT_L NP_998676.1
Gallus gallus HYP XP_001231914.1
Xenopus tropicalis ASMT_L NP_001016011.1

Chlamydomonas REINHARDTII HIMT_L XP_001695687.1

Bos taurus ASMT_L1 NP_001030230.1

Bos taurus ASMT_L2 XP_002698545.1

DBH

Homo sapiens DBH NP_000778.3

Macaca mulatta DBH XP_001100196.2

Bos taurus DBH NP_851338.1

Mus musculus DBH NP_620392.2

Rattus norvegicus DBH NP_037290.2

Monodelphis domestica DBH_L XP_001371885.1

Gallus gallus S_DBMO XP_415429.2

Xenopus tropicalis DBH_L XP_002942324.1

Danio rerio DBH NP_001103164.1

Branchiostoma floridae HYP1 XP_002596363.1

Drosophila melanogaster TBH NP_788884.1

Caenorhabditis elegans TBH NP_510562.2

Rattus norvegicus MO_DL1 XP_001054130.2

Branchiostoma floridae HYP2 XP_002606079.1

Branchiostoma floridae HYP3 XP_002606078.1

Mus musculus MO_DL1 NP_067484.2

Danio rerio MO_DL1 NP_001038671.1

Gallus gallus MO_DL1 NP_989955.1

Branchiostoma floridae HYP4 XP_002592059.1

Branchiostoma floridae HYP5 XP_002604328.1

Macaca mulatta MODL1L XP_001103212.1

Homo sapiens MO_DL1 NP_056344.2

Bos taurus MO_DL1 XP_869777.2

Branchiostoma floridae HYP6 XP_002606416.1

MAOA

Homo sapiens AOA NP_000231.1

Bos taurus AOA NP_851357.2

Rattus norvegicus AOA NP_387502.1

Mus musculus AOA NP_776101.3

Monodelphis domestica AOA XP_003341230.1

Xenopus tropicalis AOA XP_002932838.1

Gallus gallus AOB XP_416766.2

Monodelphis domestica AOBL XP_001377998.2

Mus musculus AOB NP_766366.2

Bos taurus AOB NP_808813.2

Homo sapiens AOB NP_000889.3

Macaca mulatta AOB XP_001096953.1

Rattus norvegicus AOB NP_037330.1

Danio rerio AO NP_997992.2

Macaca mulatta AOA XP_001096840.2

Xenopus tropicalis AOAL XP_002932844.1

Xenopus tropicalis MAOA NP_001120572.1

Gallus gallus MAOA NP_001025970.1
Branchiostoma floridae HYP1 XP_002593045.1
Branchiostoma floridae HYP2 XP_002593465.1
Branchiostoma floridae HYP3 XP_002593164.1
Branchiostoma floridae HYP4 XP_002601807.1
Branchiostoma floridae HYP5 XP_002601801.1
Danio rerio AOAL XP_686310.3
Branchiostoma floridae HYP6 XP_002593038.1
Monosiga brevicollis HYP1 XP_001743936.1

PNMT

Homo sapiens PNMT NP_002677.1
Macaca mulatta PNMT XP_001089850.2
Bos taurus PNMT NP_803471.2
Mus musculus PNMT NP_032916.1
Rattus norvegicus PNMT NP_113714.1
Monodelphis domestica PNMT_L XP_001370875.1
Gallus gallus PNMT XP_003642859.1
Xenopus tropicalis PNMT_L XP_002940421.1
Danio rerio PNMT_L XP_002666387.1

TYR

Homo sapiens TYR_HS NP_000363.1
Macaca mulatta TYR_mam XP_001105033.1

Bos taurus TYR_BT NP_851344.1
Rattus norvegicus TYR_RN NP_001101005.1
Mus musculus TYR_mum NP_035791.1
Gallus gallus TYR_GG NP_989491.1
Xenopus tropicalis TYR_XT NP_001096518.1
Danio rerio TYR_DR NP_571088.1
Branchiostoma floridae HYP1_BF XP_002598630.1
Branchiostoma floridae HYP2_BF XP_002606901.1
Branchiostoma floridae HYP3_BF XP_002606902.1
Danio rerio DCT_DR NP_571630.2
Homo sapiens DHICAC_HS NP_000541.1
Monodelphis domestica DHICAC_MD XP_001372482.1
Xenopus tropicalis DCT_XT NP_001017161.1
Mus musculus DCT_mum NP_034154.2
Bos taurus DHICAC_BT NP_776905.2
Rattus norvegicus DHICAC_RN NP_001100134.1
Rattus norvegicus DCTL_RN XP_001078239.2
Homo sapiens DCT_HS NP_001913.2
Danio rerio DHICAC_DR NP_001002749.1
Monodelphis domestica DCTL_MD XP_001377636.2
Macaca mulatta DHICAC_mam XP_001111475.1
Bos taurus DCT_BT NP_001012684.1
Macaca mulatta DCT_mam XP_001083129.1
Danio rerio DHICAC2_DR XP_002663085.2
Mus musculus DCICAC_mum NP_112479.1

Xenopus tropicalis TYRL_XT NP_001016476.1

Gallus gallus DCT_GG NP_990266.1

Gallus gallus DHICAC_GG NP_990376.1

Branchiostoma floridae HYP4_BF XP_002589597.1

Xenopus tropicalis TYRL2_XT XP_002941458.1

Branchiostoma floridae HYP5_BF XP_002592519.1

Branchiostoma floridae HYP6_BF XP_002597525.1

Branchiostoma floridae HYP7_BF XP_002589832.1

Branchiostoma floridae HYP8_BF XP_002587197.1

Branchiostoma floridae HYP9_BF XP_002604591.1