

## GEPHE SUMMARY

**Gephebase Gene**  
BNA5

**Entry Status**  
Published

**GepheID**  
GP00001881

**Main curator**  
Courtier

## PHENOTYPIC CHANGE

**Trait Category**  
Physiology

**Trait**  
Nicotinid acid metabolism

**Trait State in Taxon A**  
Candida albicans and Saccharomyces cerevisiae - prototroph for nicotinic acid - can synthesize nicotinic acid mononucleotide (NaMN) from tryptophan via the kynurenine pathway

**Trait State in Taxon B**  
Candida glabrata - auxotroph for nicotinic acid

**Ancestral State**  
Taxon A

**Taxonomic Status**  
Interspecific

### Taxon A

**Latin Name**  
*Candida albicans*

**Common Name**  
-

**Synonyms**  
Candida stellatoidea; Candida stellatoidea type I; ATCC 11006; ATCC 18804; ATCC 20308; ATCC:11006; ATCC:18804; ATCC:20308; BCC 5390; BCC:5390; BCRC 20512; BCRC:20512; CBS 562; CBS:562; CCRC 20512; CCRC:20512; CECT 1002; CECT:1002; IFO 1385; IFO:1385; JCM 1537; JCM 1542; JCM:1537; JCM:1542; KCTC 7270; KCTC:7270; MUCL 29800; MUCL:29800; NBIMCC 72; NBIMCC:72; NBRC 1385; NBRC:1385; NCAIM Y.00971; NCYC 597; NCYC:597; NRRL Y-12983; NRRL:Y:12983; PYCC 3436; PYCC:3436; UAMH 8765; UAMH:8765; Candida albican

**Rank**  
species

**Lineage**  
cellular organisms; Eukaryota; Opisthokonta; Fungi; Dikarya; Ascomycota; saccharomyceta; Saccharomycotina; Saccharomycetes; Saccharomycetales; Debaryomycetaceae; Candida/Lodderomyces clade; Candida

**Parent**  
Candida () - (Rank: genus)

**NCBI Taxonomy ID**  
5476

**is Taxon A an Intraspecies?**  
No

### Taxon B

**Latin Name**  
*[Candida] glabrata*

**Common Name**  
-

**Synonyms**  
Candida glabrata; Cryptococcus glabratus; Torulopsis glabrata; Cryptococcus glabratus H.W. Anderson, 1917; ATCC 2001; ATCC:2001; BCRC:20586; CBS 138; CBS:138; CCRC 20586; CCRC:20586; DBVPG 3828; DBVPG:3828; IFO 0622; IFO:0622; JCM 3761; JCM:3761; KCTC 1714; KCTC:1714; NCPF 3309; NCPF:3309; NRRL Y-1417; NRRL Y-65; NRRL:Y:1417; NRRL:Y:65; Candida glabrata

**Rank**  
species

**Lineage**  
cellular organisms; Eukaryota; Opisthokonta; Fungi; Dikarya; Ascomycota; saccharomyceta; Saccharomycotina; Saccharomycetes; Saccharomycetales; Saccharomycetaceae; Nakaseomyces; Nakaseomyces/Candida clade

**Parent**  
Nakaseomyces/Candida clade () - (Rank: no rank)

**NCBI Taxonomy ID**  
5478

**is Taxon B an Intraspecies?**  
No

## GENOTYPIC CHANGE

**Generic Gene Name**  
BNA5

**Synonyms**  
YLR231C; L8083.14

**String**  
4932.YLR231C

**Sequence Similarities**  
Belongs to the kynureninase family.

**GO - Molecular Function**  
GO:0030170 : pyridoxal phosphate binding  
GO:0030429 : kynureninase activity

**GO - Biological Process**

**UniProtKB Saccharomyces cerevisiae (strain ATCC 204508 / S288c)**  
Q05979

**GenebankID or UniProtKB**

GO:0019441 : tryptophan catabolic process to kynurenine  
GO:0034354 : 'de novo' NAD biosynthetic process from tryptophan  
GO:0043420 : anthranilate metabolic process  
GO:0019805 : quinolinate biosynthetic process  
GO:0097053 : L-kynurenine catabolic process

**GO - Cellular Component**

GO:0005737 : cytoplasm  
GO:0005634 : nucleus

**Presumptive Null**

Yes

**Molecular Type**

Gene Loss

**Aberration Type**

Deletion

**Deletion Size**

unknown

**Molecular Details of the Mutation**

Size of the deletion not mentioned in the paper

**Experimental Evidence**

**Candidate Gene**

**Main Reference**

[Nicotinic acid limitation regulates silencing of Candida adhesins during UTI. \(2005\)](#)

**Authors**

Domergue R; Castaño I; De Las Peñas A; Zupancic M; Lockatell V; Hebel JR; Johnson D; Cormack BP

**Abstract**

The adherence of *Candida glabrata* to host cells is mediated, at least in part, by the EPA genes, a family of adhesins encoded at subtelomeric loci, where they are subject to transcriptional silencing. We show that normally silent EPA genes are expressed during murine urinary tract infection (UTI) and that the inducing signal is the limitation of nicotinic acid (NA), a precursor of nicotinamide adenine dinucleotide (NAD<sup>+</sup>). *C. glabrata* is an NA auxotroph, and NA-induced EPA expression is likely the result of a reduction in NAD<sup>+</sup> availability for the NAD<sup>+</sup>-dependent histone deacetylase Sir2p. The adaptation of *C. glabrata* to the host, therefore, involves a loss of metabolic capacity and exploitation of the resulting auxotrophy to signal a particular host environment.

**Additional References**

**RELATED GEPHE**

**Related Genes**

4 (BNA1, BNA2, BNA4, BNA6)

**Related Haplotypes**

No matches found.

**COMMENTS**

Loss of four de novo biosynthesis of nicotinic acid (BNA) genes (all except BNA3 were lost) is associated with increased pathogenicity: the nicotinid acid present in the urinary tract activates expression of epithelial adhesion (EPA) genes in *C. glabrata*; thus activating adherence to host cells within the renal system. @& UniprotKB not fetched