## ISOQUINOLINE ALKALOID BIOSYNTHESIS Phenylalanine, tyrosine and tryptophan biosynthesis L-Tyrosine **►O**° Lycorine 3,4-Dihydroxybenzaldehyde K14455... K01592 K01593 K00815... K00832... Crinine K00422 \_Tyramine K00505 2.1.1.- ►•• Galanthamine **₩**0° 4-Hydroxyphenylpyruvate Norbelladine 4'-Methylnorbelladine N-Demethylnarwedine N-Demethylgalanthamine L-Dopæ∳⁵ 4.1.1.80 K00505 1.14.13.-4-Hydroxydihydrocinnamaldehyde K01592 K01593 4-Hydroxyphenylacetadehydio 5° Dopamine, Autumnaline Isoandrocymbine O-Methylandrocymbine N-Formyldemecolcine Demecolcine Deacetylcolchicine Colchicine **▶⊙**° 2.1.1.- ⊢ Floramultine Tyrosine metabolism **▶⊙** 2.1.1.- | → Kreysigine K13382 K00274 K13371... K00276 **O** Secologanin Ankorine (S)-Norcoclaurine © 3,4-DHPAA K13382 K13383 4.3.3.4 4.3.3.3 (S)-Norlaudanosoline (S)-Coclaurine Protoemetine 2'-Norberbamunine<sup>c</sup>♥ Deacetylipecoside 🗘 Deacety- Clisoipecoside **→** • Emetine (R)-N-Methylcoclaurine spontaneous spontaneous Guattegaumerine 💇 K13387 K13384 **©**Cephaeline ♥ (R)-Norre-K13383 K13387 Berbamunine 💇 Demethyl-O Demethyl- 🌣 Deoxy-**O**Tubulosine alangiside isoalangiside tubulósine (S)-N-Methylcolaurine K13385 O Papaverine (S)-6-O-Methyl-norlaudanosoline (S)-3'-Hydroxy- ॐ N-methylcoclaurine K13388 21.1.121 (S)-Nororientaline Alangiside Alangimarckine Isoalangiside K13386 K13386 °�(S)-Norreticuline (S)-Reticuline Tetrahydropalmatine K13388 1.3.3.8 K00307 K13389 K13390 2.1.1.89 1.5.-.-Palmatine (S)-Tetrahydrocolumbamine Columbamine ်တီ¹(S)-Cory-tuberine 1.3.3.8 21.1.147 **►**O Corydaline • 1,2-Dehydro-reticulinium °**©**<sup>©2</sup>Laudanine (S)-Scoulerine K13390 K21070 K13395 K21580 1.5.1.27 1.21.3.2 (S)-Canadine Berberine 1.5.1.31 ► ○ (R)-Canadine °♥⁴(S)-Cheilan-thifoline 1.3.3.8 CO338 🚅🗘 °(R)-Reticuline Magnoflorine K13395 K13388 K13391 ්**ථ**්Salutaridine ်္**ံ**(S)-Stylopine (R)-Norreticuline K13396 K13392 °**\$**Salutaridinol K13393 1.14.1337 1.14.1337 ් ප්රතික්ෂ ක්රීම් වෙන්න ක්රීම් වෙන්න ක්රීම් වෙන්න ක්රීම් **O**Protopine • Allocryptopine acetate spontaneous 1.14.13.55 **Ф**6-Hydroxyprotopine Neopinone 🗨 <sup>c</sup>♥³Thebaine spontaneous K14975 spontaneous 12-Hydroxy-dihydrochelirubine Dihydromacarpine Dihydro-sanfuinarine dihydrosanguinarine chelirubine °**Ф**'Oripavine --1.14.13*5*7 **▶℃** 1.14.13*5*6 **► ○** ┥21.1.119ト Codeinone © 💇 1.5.3.12 1.5.3.12 1.5.3.12 K13394 K14976 ° Morphinone Sanguinarine 0 Codeine 💇 Chelirubine Macarpine K14975

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