Supplemental Material

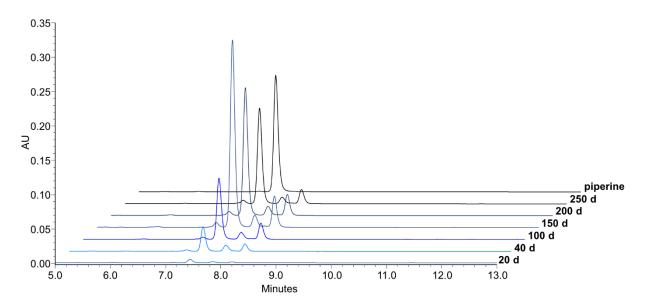
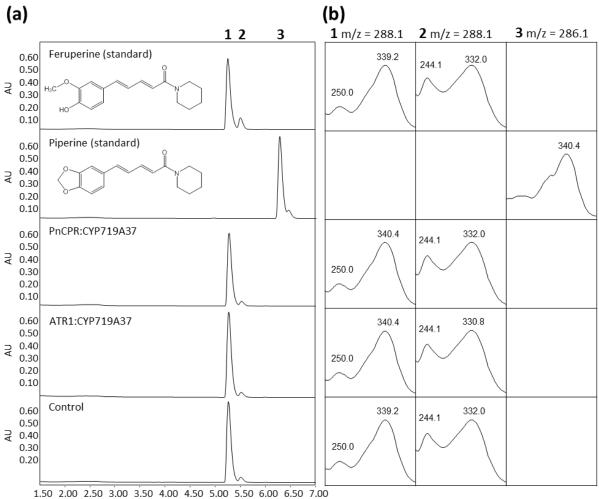
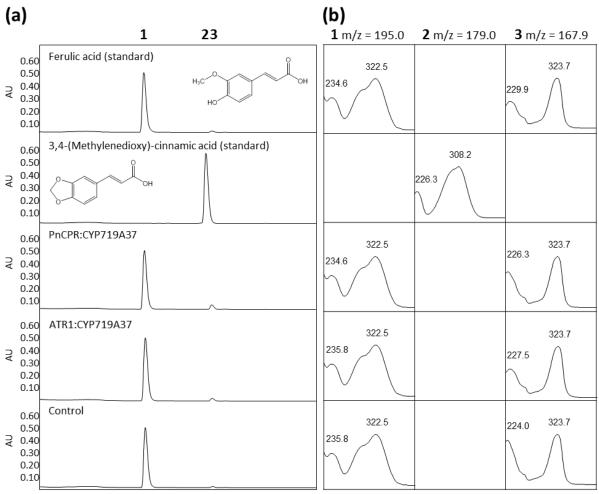


Figure S1 Accumulation of piperine during fruit development of black pepper. 5 μ l of a 10 mg/ml 90% MeOH extracted fresh fruits were analysed by LC-MS and product formation recorded at 340 nm. Days post anthesis are marked.



retention time (min)

Figure S2 Microsomes from *CYP719A37*-transformed yeast were incubated with 100 μ M feruperine (1) and its isomer side product (2) for up to 24 hours (shown). No product formation (piperine, 3) was observed, neither with co-transformed reductases, ATR1 nor with PnCPR1. Corresponding UV-spectra are shown on the right. Piperine and empty vector controls are also shown.



1.50 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 6.00 6.50 7.00 retention time (min)

Figure S3 Microsomes from CYP719A37-transformed yeast were incubated with 100 μ M ferulic acid (1) for up to 24 hours (shown). No product formation (3,4-methylendioxy cinnamic acid, 2) was observed, neither with co-transformed reductases, ATR1 nor with PnCPR1. Corresponding UV-spectra are shown on the right. The minor compound (3) is also detected in the standard and is not identical to the expected product. Ferulic acid and empty vector controls are also shown.

CYP719837	(Pni)	M			FLGMFLGRIS		SPSSTEWPD
		M					
CYP719A1		MEMN	N N				
CYP719A5		М					14
pCYP77A2	(Atr)		-MALLYLFSI	LSALLFCYLF	LS	SR	KTKALKLPP
CYP77A4	Ath)	MFPLISFSPT	SLDFTFFAII	ISGFVFIITR	WN	SN	SKKRLNLPP
				•			*
CYP719A37	(Pni)	PPKLPIIGNL	HOLNKGGELV	HHKLAKLAOS	YDRAMTIWVG	SWGPMIVVSD	ADLAWEVLV
		PPKLPIIGNL					
CYP719A1	(Cja)	PRKLPIIGNL	HQLGDDVL	HVALAKLAKV	HGSVMTIWIG	SWRPVIVISD	IEKAWEVLV
CYP719A5	(Eca)	PKKLPIIGNL	HQLGGEAF	HVVLANLAKI	HGTVMTIWVG	AWRPMIVISD	IDKAWEVLV
pCYP77A2	(Atr)	PKGWPLVGNL	LQIARSGKPF	VFIVNELSQK	YGPIFTLKMG	AR-TLIVISS	AELAHEALI
CYP77A4	Ath)	PPGWPVVGNL					
		* *::***	*:	.* :	:. :*: :*	: .:*::*.	. *.*:
		KSPDFAGRVL					
CYP719A26		KSPDFAGRVL					
CYP719A1		KSADYGARDM			P4	~	
CYP719A5		KSSDYAGRDF					
-		KGQTFANRPA					
CYP77A4	Ath)	RGALFASRPA					
		:. :. *	: :		^. ^:.:^:.		: :.
		DMKLLVSDMM					
		DMKLLVSDMM	~				
CYP719A1		DMKRLIKAMS				~	
CYP719A5		DMKNLITSMQ				14	
pCYP77A2 CYP77A4		ALDKLVERLA					
CIF//A4	Atn)		: . *:				
							•
CYP719A37	(Pni)	TIRATG	HARILDAFYF	TRHLPIIRRS	FMNTVAAKKK	IESLVRPLLS	RPAPP
CYP719A26		TIGATG					
CYP719A1		IIRISG					
CYP719A5		LVRISG					
pCYP77A2	$(\Delta \pm r)$	TTTTFDDTDD	FIDITONTEV			TRODUUMTON	TMCTE
			14		KEQLETLLPL	14	
CYP77A4		LMTVDPRIDD	YLPILAPFFS	KERKRALEVR	14	IERRRRAIQN	
	Ath)	LMTVDPRIDD :	YLPILAPFFS . : .:	KERKRALEVR	REQVDYVVGV	IERRRRAIQN : :.	PGSDKTASS
CYP719A37	Ath) (Pni)	LMTVDPRIDD : SYLHFLLSTD	YLPILAPFFS . : .: APE	KERKRALEVR · · · SMIIFRIFEV	REQVDYVVGV : YL D GVD E TAS	IERRRAIQN : :. TTTWALAFLV	PGSDKTASS
CYP719A37 CYP719A26	Ath) (Pni) (Pme)	LMTVDPRIDD : SYLHFLLSTD SYLHFLLSTD	YLPILAPFFS . : .: APE APE	KERKRALEVR	REQVDYVVGV	IERRRAIQN : :. TTTWALAFLV	PGSDKTASS
CYP719A37 CYP719A26 CYP719A1	Ath) (Pni) (Pme) (Cja)	LMTVDPRIDD : SYLHFLLSTD SYLHFLLSTD SYLYFLLSQN	YLPILAPFFS . : .: APE APE FEE	KERKRALEVR SMIIFRIFEV NMIIFRIFEV EVIIFCIFEL	REQVDYVVGV YLIGVDSTAS YLIGVDSTAS YLIGVDSTSS	IERRRRAIQN : :. TTTWALAFLV TTTWALAFLV TTTWALAFLV	PGSDKTASS SNQQAQEKL SNQQAQEKL REQGAQEKL
CYP719A37 CYP719A26 CYP719A1 CYP719A5	Ath) (Pni) (Pme) (Cja) (Eca)	LMTVDPRIDD : SYLHFLLSTD SYLHFLLSTD SYLYFLLSQN TYLYFLNSOK	YLPILAPFFS . : .: APE APE FEE FSD	KERKRALEVR SMIIFRIFEV NMIIFRIFEV EVIIFCIFEL EVIISAVLEV	REQVDYVVGV : YLEGVDSTAS YLEGVDSTAS YLEGVDSTAS YDEGVDSTAS	IERRRRAIQN : :. TTTWALAFLV TTTWALAFLV TTTWALAFLV TTTWALAYLI TAVWALTFLV	PGSDKTASS SNQQAQEKL SNQQAQEKL REQGAQEKL REPRVOEKL
CYP719A37 CYP719A26 CYP719A1 CYP719A5 pCYP77A2	Ath) (Pni) (Pme) (Cja) (Eca) (Atr)	LMTVDPRIDD : SYLHFLLSTD SYLHFLLSTD SYLYFLLSQN TYLYFLNSQK AYIDSLFDLD	YLPILAPFFS . : .: APE FEE FSD MGQGPPSE	KERKRALEVR SMIIFRIFEV NMIIFRIFEV EVIIFCIFEL EVIISAVLEV DMLVTLCAEF	REQUDYVVGV : YINGVDSTAS YINGVDSTAS YINGVDSTAS YDGVDSTAS LNCGTDTAT	IERRRRAIQN : :. TTTWALAFLV TTTWALAFLV TTTWALAFLV TAVWALTFLV AVEWAMAHLV	PGSDKTASS SNQQAQEKI SNQQAQEKI REQGAQEKI REPRVQEKI ADSEIQTRV
CYP719A37 CYP719A26 CYP719A1 CYP719A5 pCYP77A2	Ath) (Pni) (Pme) (Cja) (Eca) (Atr)	LMTVDPRIDD : SYLHFLLSTD SYLHFLLSTD SYLYFLLSQN TYLYFLNSQK AYIDSLFDLD SYLDTLFDLK	YLPILAPFFS . : .: APE FEE FSD MGQGPPSE IEGRKTTPSN	KERKRALEVR SMIIFRIFEV NMIIFRIFEV EVIIFCIFEL EVIISAVLEV DMLVTLCAEF EELVTLCSEF	REQUDYVVGV YIPGVDSTAS YIPGVDSTAS YIPGVDSTAS YDGVDSTAS LNCGTDATAT LNCGTDATGT	IERRRRAIQN : :. TTTWALAFLV TTTWALAFLV TTTWALAFLV TAVWALTFLV AVEWAMAHLV AIEWGIAQLI	PGSDKTASS SNQQAQEKI SNQQAQEKI REQGAQEKI REPRVQEKI ADSEIQTRV ANPEIQSRI
CYP719A37 CYP719A26 CYP719A1 CYP719A5 pCYP77A2	Ath) (Pni) (Pme) (Cja) (Eca) (Atr)	LMTVDPRIDD : SYLHFLLSTD SYLHFLLSTD SYLYFLLSQN TYLYFLNSQK AYIDSLFDLD	YLPILAPFFS . : .: APE FEE FSD MGQGPPSE IEGRKTTPSN	KERKRALEVR SMIIFRIFEV EVIIFCIFEL EVIISAVLEV DMLVTLCAEF EELVTLCSEF . :: *.	REQUDYVVGV YIPGVDSTAS YIPGVDSTAS YIPGVDSTAS YDGVDSTAS LNCGTDATAT LNCGTDATGT	IERRRRAIQN : :. TTTWALAFLV TTTWALAFLV TTTWALAFLV TAVWALTFLV AVEWAMAHLV	PGSDKTASS SNQQAQEKI SNQQAQEKI REQGAQEKI REPRVQEKI ADSEIQTRV ANPEIQSRI
CYP719A37 CYP719A26 CYP719A1 CYP719A5 pCYP77A2 CYP77A4 CYP719A37	Ath) (Pni) (Cme) (Cja) (Eca) (Atr) Ath) (Pni)	LMTVDPRIDD : SYLHFLLSTD SYLYFLLSTD SYLYFLLSQN AYIDSLFDLD SYLDTLFDLK :*: * NELAQYCASQ	YLPILAPFFS . : .: APE APE FEE FSD MGQGPPSE IEGRKTTPSN : NNQNIKAEDV	KERKRALEVR SMIIFRIFEV NMIIFRIFEV EVIISAVLEV DMLVTLCAEF EELVTLCSEF . :: *. Khe GKLSYLLGVV	REQUDYVVGV : YIJGVDSTAS YIJGVDSTAS YIJGVDSTSS YDGVDSTAS LNGTDTTAT LNGTDTTAT *.*:*.: DIX KETMRMKPIA	IERRRAIQN : :. TTTWALAFLV TTTWALAFLV TTTWALAYLI TAVWALTFLV AVEWAMAHLV AIEWGIAQLI : *.:: *: PLAVPHKTLK	PGSDKTASS SNQQAQEKL SNQQAQEKL REQRAQEKL REPRVQEKL ADSEIQTRV ANPEIQSRL : * :: ETMLDGKRV
CYP719A37 CYP719A26 CYP719A1 CYP719A5 pCYP77A2 CYP77A4 CYP719A37 CYP719A26	Ath) (Pni) (Cja) (Eca) (Atr) Ath) (Pni) (Pme)	LMTVDPRIDD : SYLHFLLSTD SYLHFLLSTD SYLYFLLSQN TYLYFLNSQK AYIDSLFDLD SYLDTLFDLK :*: * NELAQYCASQ NELAQYCASQ	YLPILAPFFS . : .: APE FEE FSD MGQGPPSE IEGRKTTPSN NNQNIKAEDV NNQIIKADDV	KERKRALEVR SMIIFRIFEV NMIIFRIFEV EVIIFCIFEL EVIISAVLEV DMLVTLCAEF EELVTLCSEF . : *. Khd GKLSYLLGVV GKLSYLLGVV	REQVDYVVGV YL GVDSTAS YL GVDSTAS YD GVDSTSS YD GVDSTSS LN GTDTAT LN GTDTAT LN GTDTAT KETMRMKPIA KETMRMKPIA	IERRRAIQN : :. TTTWALAFLV TTTWALAFLV TTTWALAYLI TAVWALTFLV AVEWAMAHLV AIEWGIAQLI : *.:: *: PLAVPHKTLK PLAVPHKTLK	PGSDKTASS SNQQAQEKI SNQQAQEKI REQGAQEKI REPRVQEKI ADSEIQTRV ANPEIQSRI : * :: ETMLDGKRV ETMLDGKRV
CYP719A37 CYP719A26 CYP719A1 CYP719A5 pCYP77A2 CYP77A4 CYP719A37 CYP719A26 CYP719A1	Ath) (Pni) (Cja) (Eca) (Atr) Ath) (Pni) (Pme) (Cja)	LMTVDPRIDD : SYLHFLLSTD SYLYFLLSQN TYLYFLNSQK AYIDSLFDLD SYLDTLFDLK :*: * NELAQYCASQ QDIRMTLGDV	YLPILAPFFS . : .: APE FEE FSD MGQGPPSE IEGRKTPSN NNQNIKAEDV NNQIIKADV DLVKIEDV	KERKRALEVR SMIIFRIFEV NMIIFRIFEV EVIIFCIFEL EVIISAVLEV DMLVTLCAEF EELVTLCSEF C::** Khd GKLSYLLGVV NKLKYLQVV	REQUDYVVGV YL GVDSTAS YL GVDSTAS YD GVDSTSS YD GVDSTSS LN GTDTAT LN GTDTAT LN GTDTAT KETMRMKPIA KETMRMKPIA	IERRRAIQN : :. TTTWALAFLV TTTWALAFLV TTTWALAYLI TAVWALTFLV AVEWAMAHLV AIEWGIAQLI : *.:: *: PLAVPHKTLK PLAVPHKTLK PLAIPHKTAK	PGSDKTASS SNQQAQEKL SNQQAQEKL REQGAQEKL REPRVQEKL ADSEIQTRV ANPEIQSRL : * :: ETMLDGKRV ETTLMGTKV
CYP719A37 CYP719A26 CYP719A1 CYP719A5 pCYP77A2 CYP77A4 CYP719A37 CYP719A37 CYP719A36 CYP719A1 CYP719A5	Ath) (Pni) (Cja) (Eca) (Atr) Ath) (Pni) (Pme) (Cja) (Eca)	LMTVDPRIDD : SYLHFLLSTD SYLYFLLSQN TYLYFLNSQK AYIDSLFDLD SYLDTLFDLK :*: * NELAQYCASQ QDIRMTLGDV KEIIDLTGGE	YLPILAPFFS . : .: APE FEE FSD MGQGPPSE IEGRKTTPSN NNQNIKAEDV NNQIIKADV DLVKIEDV RSVKVEDV	KERKRALEVR SMIIFRIFEV EVIIFCIFEL EVIISAVLEV DMLVTLCAEF EELVTLCSEF . :: *. K hû GKLSYLLGVV SKLFYLQVV SKLFYLQAVM	REQUDYVVGV : YI GVDSTAS YI GVDSTAS IN GTDITAT LN GTDITAT *.*:*.: PIIX KETMRMKPIA KETMRMKPIA KETMRMKPIA	IERRRAIQN : :. TTTWALAFLV TTTWALAFLV TTTWALAYLI TAVWALTFLV AVEWAMAHLV AIEWGIAQLI : *.:: *: PLAVPHKTLK PLAVPHKTLK PLAVPHKTLK PMAIPHKTSR	PGSDKTASS SNQQAQEKI REQGAQEKI REPRVQEKI ADSEIQTRV ANPEIQSRI : * :: ETMLDGKRV ETTLMGTKV DTSLMGKKV
CYP719A37 CYP719A26 CYP719A1 CYP719A5 pCYP77A2 CYP77A4 CYP719A37 CYP719A26 CYP719A1 CYP719A1 CYP719A5 pCYP77A2	Ath) (Pni) (Cja) (Eca) (Atr) Ath) (Pni) (Cja) (Eca) (Atr)	LMTVDPRIDD : SYLHFLLSTD SYLYFLLSQN TYLYFLNSQK AYIDSLFDLD SYLDTLFDLK :*: * NELAQYCASQ NELAQYCASQ QDIRMTLGDV KEIIDLTGGE AEIDR-VSPD	YLPILAPFFS . : .: APE FEE FSD MGQGPPSE IEGRKTTPSN : NNQNIKAEDV NNQIIKADV DLVKIEDV RSVKVEDV HRVNDEDV	KERKRALEVR SMIIFRIFEV EVIIFCIFEL EVIISAVLEV DMLVTLCAEF EELVTLCSEF . : *. Khé GKLSYLLGVV GKLSYLLGVV SKLFYLQAVM EKMEYLQAFV	REQUDYVVGV : YI GVDSTAS YI GVDSTAS UNGTDITAT LNGGTDITAT LNGGTDITAT LNGGTDITGT *.*:*: EIIX KETMRMKPIA KETMRMKPIA KETMRMKPIA KETLRKHPPT	IERRRAIQN : :. TTTWALAFLV TTTWALAFLV TTTWALAYLI TAVWALTFLV AVEWAMAHLV AIEWGIAQLI : *.:: *: PLAVPHKTLK PLAVPHKTLK PLAVPHKTK PMAIPHKTSR YFLLTHAVTE	PGSDKTASS SNQQAQEKL REQGAQEKL REQRAQEKL ADSEIQTRV ANPEIQSRL : * :: ETMLDGKRV ETTLMGTKV DTSLMGKKV KSTLGGYDI
CYP719A37 CYP719A26 CYP719A1 CYP719A5 pCYP77A2 CYP77A4 CYP719A37 CYP719A26 CYP719A1 CYP719A1 CYP719A5 pCYP77A2	Ath) (Pni) (Cja) (Eca) (Atr) Ath) (Pni) (Cja) (Eca) (Atr)	LMTVDPRIDD : SYLHFLLSTD SYLYFLLSQN TYLYFLNSQK AYIDSLFDLD SYLDTLFDLK :*: * NELAQYCASQ NELAQYCASQ QDIRMTLGDV KEIIDLTGGE AEIDR-VSPD DEIKSTVGDD	YLPILAPFFS . : .: APE FEE FSD MGQGPPSE IEGRKTTPSN .: NNQNIKAEDV NNQIIKADDV D-LVKIEDV RSVKVEDV HRVNDEDV RRVDEKDV	KERKRALEVR SMIIFRIFEV EVIIFCIFEL EVIISAVLEV DMLVTLCAEF EELVTLCSEF *. Kho GKLSYLLGVV GKLSYLLGVV NKLKYLQGVV SKLFYLQAVM EKMEYLQAFV DKMVFLQAFV	REQUDYVVGV : YI GVDSTAS YI GVDSTAS YD GVDSTAS LNGGTDATAT LNGGTDATAT LNGGTDATAT KETMRMKPIA KETMRMKPIA KETMRMKPIA KETLRKHPPT KELLRKHPPT	IERRRRAIQN : :. TTTWALAFLV TTTWALAFLV TTTWALAYLI TAVWALTFLV AVEWAMAHLV AIEWGIAQLI : *.:: *: PLAVPHKTLK PLAVPHKTLK PLAIPHKTAK PMAIPHKTSR YFLLTHAVTE YFSLTHAVME	PGSDKTASS SNQQAQEKL SNQQAQEKL REQGAQEKL REPRVQEKL ADSEIQTRV ANPEIQSRL : * :: ETMLDGKRV ETTLMGTKV DTSLMGKKV KSTLGGYDI TTTLAGYDI
CYP719A37 CYP719A26 CYP719A1 CYP719A5 pCYP77A2 CYP77A4 CYP719A37 CYP719A26 CYP719A1 CYP719A1 CYP719A5 pCYP77A2	Ath) (Pni) (Cja) (Eca) (Atr) Ath) (Pni) (Cja) (Eca) (Atr)	LMTVDPRIDD : SYLHFLLSTD SYLYFLLSQN TYLYFLNSQK AYIDSLFDLD SYLDTLFDLK :*: * NELAQYCASQ NELAQYCASQ QDIRMTLGDV KEIIDLTGGE AEIDR-VSPD	YLPILAPFFS . : .: APE FEE FSD MGQGPPSE IEGRKTTPSN : NNQNIKAEDV NNQIIKADDV DLVKIEDV RSVKVEDV HRVDEDV RRVDEKDV :**	KERKRALEVR SMIIFRIFEV EVIIFCIFEL EVIISAVLEV DMLVTLCAEF EELVTLCSEF *. Kho GKLSYLLGVV GKLSYLLGVV NKLKYLQGVV SKLFYLQAVM EKMEYLQAFV DKMVFLQAFV	REQUDYVVGV : YI GVDSTAS YI GVDSTAS YD GVDSTAS LNGGTDATAT LNGGTDATAT LNGGTDATAT KETMRMKPIA KETMRMKPIA KETMRMKPIA KETLRKHPPT KELLRKHPPT	IERRRAIQN : :. TTTWALAFLV TTTWALAFLV TTTWALAYLI TAVWALTFLV AVEWAMAHLV AIEWGIAQLI : *.:: *: PLAVPHKTLK PLAVPHKTLK PLAVPHKTK PMAIPHKTSR YFLLTHAVTE	PGSDKTASS SNQQAQEKL SNQQAQEKL REQGAQEKL REPRVQEKL ADSEIQTRV ANPEIQSRL : * :: ETMLDGKRV ETTLMGTKV DTSLMGKKV KSTLGGVDI TTTLAGYDI <u>:</u> * * :
CYP719A37 CYP719A26 CYP719A1 CYP719A5 pCYP77A2 CYP77A4 CYP719A37 CYP719A37 CYP719A5 pCYP77A4 CYP719A37	Ath) (Pni) (Cja) (Eca) (Atr) Ath) (Pni) (Cja) (Cja) (Eca) (Atr) Ath) (Pni)	LMTVDPRIDD : SYLHFLLSTD SYLYFLLSQN TYLYFLNSQK AYIDSLFDLD SYLDTLFDLK :*: * NELAQYCASQ QDIRMTLGDV KEIIDLTGGE AEIDR-VSPD DEIKSTVGDD :: AGTTVVVNLY	YLPILAPFFS . : .: APE FEE FSD MGQGPPSE IEGRKTTPSN : NNQNIKAEDV NNQIIKAEDV NNQIIKADDV DLVKIEDV RSVKVEDV HRVNEDV RRVDEKDV RRVDEKDV ** azoma	KERKRALEVR SMIIFRIFEV EVIIFCIFEL EVIISAVLEV DMLVTLCAEF EELVTLCSEF C:: *. Khd GKLSYLLGVV GKLSYLLGVV NKLKYLQAVV SKLFYLQAVM EKMEYLQAFV DKMVFLQAFV *: :*: tic region EPEQFRPERF	REQUDYVVGV : YL GVDSTAS YL GVDSTAS YD GVDSTAS LN GTDTAT LN GTDTAT *.*:*: Plix KETMRMKPIA KETMRMKPIA KETLRKHPPT KELLRKHPPT **:*:*:	IERRRAIQN : :. TTTWALAFLV TTTWALAFLV TTTWALAFLV TTWALAYLI TAVWALTFLV AVEWAMAHLV AIEWGIAQLI : *.:: *: PLAVPHKTLK PLAVPHKTLK PLAVPHKTLK PLAIPHKTSR YFLLTHAVTE : :.* GSSEYMLQSY	PGSDKTASS SNQQAQEKI REQGAQEKI REPRVQEKI ADSEIQTRV ANPEIQSRI : * :: ETMLDGKRV ETTLMGTKV DTSLMGKKV KSTLGGYDI : * : heme- LPFGGGMRA
CYP719A37 CYP719A26 CYP719A1 CYP719A5 pCYP77A2 CYP77A4 CYP719A37 CYP719A37 CYP719A5 pCYP77A4 CYP719A37	Ath) (Pni) (Cja) (Eca) (Atr) Ath) (Pni) (Cja) (Cja) (Eca) (Atr) Ath) (Pni)	LMTVDPRIDD : SYLHFLLSTD SYLHFLLSTD SYLYFLLSQN TYLYFLNSQK AYIDSLFDLD SYLDTLFDLK :*: * NELAQYCASQ QDIRMTLGDV KEIIDLTGGE AEIDR-VSPD DEIKSTVGDD :: .	YLPILAPFFS . : .: APE FEE FSD MGQGPPSE IEGRKTTPSN : NNQNIKAEDV NNQIIKAEDV NNQIIKADDV DLVKIEDV RSVKVEDV HRVNEDV RRVDEKDV RRVDEKDV ** azoma	KERKRALEVR SMIIFRIFEV EVIIFCIFEL EVIISAVLEV DMLVTLCAEF EELVTLCSEF C:: *. Khd GKLSYLLGVV GKLSYLLGVV NKLKYLQAVV SKLFYLQAVM EKMEYLQAFV DKMVFLQAFV *: :*: tic region EPEQFRPERF	REQUDYVVGV : YL GVDSTAS YL GVDSTAS YD GVDSTAS LN GTDTAT LN GTDTAT *.*:*: Plix KETMRMKPIA KETMRMKPIA KETLRKHPPT KELLRKHPPT **:*:*:	IERRRAIQN : :. TTTWALAFLV TTTWALAFLV TTTWALAFLV TTWALAYLI TAVWALTFLV AVEWAMAHLV AIEWGIAQLI : *.:: *: PLAVPHKTLK PLAVPHKTLK PLAVPHKTLK PLAIPHKTSR YFLLTHAVTE : :.* GSSEYMLQSY	PGSDKTASS SNQQAQEKI REQGAQEKI REPRVQEKI ADSEIQTRV ANPEIQSRI : * :: ETMLDGKRV ETTLMGTKV DTSLMGKKV KSTLGGYDI : * : heme- LPFGGGMRA
CYP719A37 CYP719A26 CYP719A5 pCYP77A2 CYP77A4 CYP719A37 CYP719A26 CYP719A26 CYP719A1 CYP719A5 pCYP77A4 CYP719A37 CYP719A37 CYP719A37 CYP719A31	Ath) (Pni) (Cja) (Eca) (Atr) Ath) (Pni) (Cja) (Eca) (Atr) Ath) (Pni) (Pni) (Pne) (Cja)	LMTVDPRIDD : SYLHFLLSTD SYLYFLLSQN TYLYFLNSQK AYIDSLFDLD SYLDTLFDLK :*: * NELAQYCASQ QDIRMTLGDV KEIIDLTGGE AEIDR-VSPD DEIKSTVGDD :: . AGTTVVVNLY KGTRIMVNLY	YLPILAPFFS . : .: APE FEE FSD MGQGPPSE IEGRKTTPSN NNQIIKAEDV NNQIIKADV DLVKIEDV RSVKVEDV HRVNDEDV RSVKVEDV HRVDEKDV RRVDEKDV AVHYNPKLWP AVHYNPKLWP ALHHNQNIWP	KERKRALEVR MIIFRIFEV EVIISAVLEV DMLVTLCAEF EELVTLCSEF . :: *. K hû GKLSYLLGVV GKLSYLLGVV SKLFYLQAVW EKMEYLQAVW EKMEYLQAFV tic region EPEQFRPERF DPYKFMPERF	REQUDYVVGV : YI GVDSTAS YI GVDSTAS IN GTDITAT LN GTDITAT LN GTDITAT LN GTDITAT KETMRMKPIA KETMRMKPIA KETMRMKPIA KETLRKHPPT KELLRKHPPT **:*:*:	IERRRAIQN : :. TTTWALAFLV TTTWALAFLV TTTWALAYLI TAVWALTFLV AVEWAMAHLV AIEWGIAQLI : *.:: *: PLAVPHKTLK PLAVPHKTLK PLAVPHKTLK PLAVPHKTSR YFLLTHAVTE YFSLTHAVME : :.* GSSEYMLQSY GSSEYMLQSY AYNKAMEQSF	PGSDKTASS SNQQAQEKL REQGAQEKL REPRVQEKL ADSEIQTRV ANPEIQSRL : * :: ETMLDGKRV ETTLMGKRV DTSLMGKKV KSTLGGYDI TTTLAGVDI : * * : LPFGGGMRS LPFGGGMRS LPFSAGMRI
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CYP719A37 CYP719A1 CYP719A5 pCYP77A2 CYP77A4 CYP719A37 CYP719A26 CYP719A26 CYP719A2 CYP719A5 pCYP77A4 CYP719A37 CYP719A37 CYP719A37 CYP719A37 CYP719A36 CYP719A37	Ath) (Pni) (Cja) (Eca) (Atr) Ath) (Pni) (Cja) (Eca) (Atr) (Pni) (Pne) (Cja) (Cja) (Eca) (Atr)	LMTVDPRIDD : SYLHFLLSTD SYLYFLLSQN TYLYFLNSQK AYIDSLFDLD SYLDTLFDLK :*: * NELAQYCASQ QDIRMTLGDV KEIIDLTGGE AEIDR-VSPD DEIKSTVGDD :: AGTTVVVNLY KGTRIMVNLY EGVNVDFYTP	YLPILAPFFS . : .: APE FEE FSD MGQGPPSE IEGRKTTPSN .: NNQNIKAEDV NNQIIKADDV DLVKIEDV RSVKVEDV HRVNDEDV RSVKVEDV HRVNDEDV RSVKVEDV HRVDEKDV ** AVHYNPKLWP ALHHNQNIWP AIHHNPKVFP SISDDPKLWG	KERKRALEVR SMIIFRIFEV EVIIFCIFEL EVIISAVLEV DMLVTLCAEF EELVTLCSEF *. Khe GKLSYLLGVV NKLKYLQGVV SKLFYLQAVM EKMEYLQAFV DKMVFLQAFV *: <u>i*</u> tic region EPEQFRPERF EPEQFRPERF DPYKFMPERF DPERFRPERF	REQUDYVVGV : YI GVDSTAS YD GVDSTAS YD GVDSTAS CODSTAS IN GTD TAT IN GTD TAT IN GTD TAT IN GTD TAT IN GTD TAT KETMRMKPIA KETMRMKPIA KETMRMKPIA KETLRKHPPT KELLRKHPPT KELLRKHPPT ** :* :* :* :	IERRRAIQN : :. TTTWALAFLV TTTWALAFLV TTTWALAFLV TTTWALAFLV AVEWAMAHLV AVEWAMAHLV AIEWGIAQLI : *.:: *: PLAVPHKTLK PLAVPHKTLK PLAVPHKTLK PLAVPHKTLK PLAVPHKTLK SSEYMLQSY GSSEYMLQSY ANKAMEQSF GDIKEMEQSL DLTGVKGVKM	PGSDKTASS SNQQAQEKI SNQQAQEKI REQGAQEKI REPRVQEKI ADSEIQTRV ANPEIQSRI : * :: ETMLDGKRV ETTLMGTKV DTSLMGKVV KSTLGGYDI TTTLAGYDI : * * : PFGGMRA LPFGGGRAS LPFSAGMRI MPFGVGRRI
CYP719A37 CYP719A1 CYP719A5 pCYP77A2 CYP77A4 CYP719A37 CYP719A26 CYP719A26 CYP719A2 CYP719A5 pCYP77A4 CYP719A37 CYP719A37 CYP719A37 CYP719A37 CYP719A36 CYP719A37	Ath) (Pni) (Cja) (Eca) (Atr) Ath) (Pni) (Cja) (Eca) (Atr) (Pni) (Pne) (Cja) (Cja) (Eca) (Atr)	LMTVDPRIDD : SYLHFLLSTD SYLHFLLSTD SYLYFLSQN TYLYFLNSQK AYIDSLFDLD SYLDTLFDLK :*: * NELAQYCASQ QDIRMTLGDV KEIIDLTGGE AEIDR-VSPD DEIKSTVGDD :: . AGTTVVVNLY KGTSIMVNLY KGTSIMVNLY AGVNVEVYLP	YLPILAPFFS . : .: APE FEE FSD MG-QGPPSE IEGRKTTPSN : NNQNIKAEDV NNQIIKADDV DLVKIEDV RSVKVEDV HRVNEDV HRVNEDV RRVDEKDV :** AVHYNPKLWP AVHYNPKLWP ALHHNPKLWP ALHHNPKLWP ALHHNPKVFP SISDDPKLWG GISEDPRIWN	KERKRALEVR MMIIFRIFEV EVIIFCIFEL EVIISAVLEV DMLVTLCAEF EELVTLCSEF C:: *. K he GKLSYLLGVV GKLSYLLGVV GKLSYLLGVV NKLKYLQAVV SKLFYLQAVV DKMVFLQAFV DKMVFLQAFV *: :*: tic region EPEQFRPERF DPYKFMPERF DPERFRPERF NPKKFDPDRF	REQVDYVVGV YI GVDSTAS YD GVDSTAS YD GVDSTAS YD GVDSTSS YD GVDSTSS IN GTDTTAT LN GTDTTAT LN GTDTTAT LN GTDTAT KETMRMKPIA KETMRMKPIA KETMRMKPIA KETMRMKPIA KETMRMKPIA KETLRKHPPT KELLRKHPPT **::*:*: VIGASGGNGG VVGASGGNGG LGGETGT LQGQ-ESKY VDKMDGDDA MLGKEDA	IERRRAIQN : :. TTTWALAFLV TTTWALAFLV TTTWALAFLV TTTWALAYLI TAVWALTFLV AVEWAMAHLV AIEWGIAQLI : *.:: *: PLAVPHKTLK PLAVPHKTLK PLAIPHKTAK PMAIPHKTSR YFSLTHAVTE YFSLTHAVTE GSSEYMLQSY GSSEYMLQSY GDIKEMEQSE DLTGVKGVKM DITGISGVKM	PGSDKTASS SNQQAQEKI SNQQAQEKI REQGAQEKI REPRVQEKI ADSEIQTRV ANPEIQSRI : * :: ETMLDGKRV ETTLMGTKV DTSLMGKKV KSTLGGYDI : * : PFGGGMRS LPFGGGMRS LPFSGGMRI LPFSGGRRI LPFSQGRRI LPFSQGRRI
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Figure S4 Amino acid sequence of CYP719A37 (MT643912). Characteristic features and relevant amino acids are shown.