

SUPPLEMENTARY MATERIALS

to the article A.M. Kondybayeva et al. "The characteristics of miRNA binding sites in mRNA of ZFHX3 gene and its orthologs"

Supplementary table 1. The list of abbreviations of animal species, used in the article

Full name	Abbreviations	Full name	Abbreviations
<i>Acinonyx jubatus</i>	Aju	<i>Lipotes vexillifer</i>	Lve
<i>Ailuropoda melanoleuca</i>	Ame	<i>Loxodonta africana</i>	Laf
<i>Alligator mississippiensis</i>	Ami	<i>Macaca fascicularis</i>	Mfa
<i>Anas platyrhynchos</i>	Apl	<i>Macaca mulatta</i>	Mml
<i>Anser cygnoides domesticus</i>	Acy	<i>Mus musculus</i>	Mmu
<i>Balaenoptera acutorostrata</i>	Bac	<i>Myotis davidii</i>	Mda
<i>Bos indicus</i>	Bin	<i>Nannospalax galili</i>	Nga
<i>Bos mutus</i>	Bmu	<i>Nomascus leucogenys</i>	Nle
<i>Bos taurus</i>	Bta	<i>Ornithorhynchus anatinus</i>	Oan
<i>Camelus dromedaries</i>	Cdr	<i>Oryctolagus cuniculus</i>	Ocu
<i>Camelus ferus</i>	Cfe	<i>Ovis aries</i>	Oar
<i>Canis familiaris</i>	Cfa	<i>Pan paniscus</i>	Ppa
<i>Capra hircus</i>	Chi	<i>Pan troglodytes</i>	Ptr
<i>Castor canadensis</i>	Cca	<i>Panthera tigris altaica</i>	Pti
<i>Chelonia mydas</i>	Cmy	<i>Pantholops hodgsonii</i>	Pho
<i>Chlorocebus sabaeus</i>	Csa	<i>Peromyscus maniculatus</i>	Pma
<i>Coturnix japonica</i>	Cja	<i>Pongo abelii</i>	Pab
<i>Cricetulus griseus</i>	Cgr	<i>Pseudopodoces humilis</i>	Phu
<i>Equus asinus</i>	Eas	<i>Pteropus alecto</i>	Pal
<i>Equus caballus</i>	Eca	<i>Rattus norvegicus</i>	Rno
<i>Equus przewalskii</i>	Epr	<i>Rhinolophus sinicus</i>	Rsi
<i>Falco peregrinus</i>	Fpe	<i>Rhinopithecus bieti</i>	Rbi
<i>Felis catus</i>	Fca	<i>Rhinopithecus roxellana</i>	Rro
<i>Ficedula albicollis</i>	Fal	<i>Saimiri boliviensis</i>	Sbo
<i>Gallus gallus</i>	Gga	<i>Sus scrofa</i>	Ssc
<i>Gorilla gorilla</i>	Ggo	<i>Tupaia chinensis</i>	Tch
<i>Heterocephalus glaber</i>	Hgl	<i>Ursus maritimus</i>	Uma
<i>Hipposideros armiger</i>	Har	<i>Xenopus tropicalis</i>	Xtr
<i>Homo sapiens</i>	Hsa		

Supplementary table 2. The list of miRNAs and their sequences (Londin et al., 2015)

miRNA	Sequence	miRNA	Sequence
mir-1-1819-3p	ccuccccugccgcggccgcuccac	mir-11-29856-3p	uacugaguugcaguaggguauc
mir-1-2121-3p	ggcgccggccggcggcggggggggg	mir-12-32603-3p	ucuccuccuccucaaccucaucc
mir-1-2770-3p	cuggcgaggccgcgaggaggaggga	mir-17-39416-3p	gccucgccgcgcgcucugcugc
mir-2-6184-3p	gcaggaggaggaggaggaggagguga	mir-18-39953-5p	ccgccccgcgcuccccggcgccc
mir-2-6862-5p	ccucuccgcaccuccaccgcgg	mir-19-21199-3p	agggcggcggcggcggcggcgggg
mir-5-14114-5p	gcggggggcgaggggggaggaggaga	mir-19-33623-3p	guggcggcggcggcggcgggggggg
mir-5-15733-3p	cuuggcgcgccgcgcgcgcgc	mir-19-43437-5p	ggguugggaaggugauggggaa
mir-6-17815-3p	ccgucgcgcgcgcgcgcgcgc	mir-20-23817	ggggccggcgccggcgcggcggg
mir-9-20317-3p	ggcgccgcgcgcgcgcgcgc	mir-x-48174-3p	uccuccgcgcaccuccgcgcgc
mir-9-25681-5p	cgcugcuccugcugcuacuga		

Supplementary table 3. Schematic representation of interaction of miRNA with 5'UTR, CDS, 3'UTR mRNA of *Hsa ZFHX3* gene

miRNA, site, region of mRNA, characteristics of binding	Scheme
miR-15-36707-5p, 26, 5'UTR, -125 kJ/mole, 88 %, 23 nt	mRNA 5' -UCCCUGCGGGCGGGCGCGG-3' miRNA 3' -GGGGUCGCCGCCGCCGGGUC-5'
miR-20-24547-3p, 183, 5'UTR, -119 kJ/mole, 89 %, 22 nt	mRNA 5' -GGCCCCCGCCCCGCCGCC-3' miRNA 3' -GUGGGGGACGGGGCGGGCGGU-5'
miR-5-15733-3p, 290, 5'UTR, -127 kJ/mole, 86 %, 24 nt	mRNA 5' -GGCAGGGCGGGCGGGCGGC-3' miRNA 3' -CCGCCGCCGCCGCCGGCGGUUC-5'
miR-9-20317-3p, 278, 5'UTR, -132 kJ/mole, 89 %, 24 nt	mRNA 5' -GGCAGAGGAGGAGGGCGGGCGGC-3' miRNA 3' -CCGCCUCCGCCUCCGCCACGCCUCCU-5'
miR-X-48174-3p, 278, 5'UTR, -121 kJ/mole, 85 %, 24 nt	mRNA 5' -GGCAGAGGAGGAGGGCGGGCGGC-3' miRNA 3' -CCGUCCCCGCCUCCACCGCCUCCU-5'
miR-9-26096-3p, 287, 5'UTR, -115 kJ/mole, 87 %, 22 nt	mRNA 5' -GGAGGCGGCGGGCGGGCAGG-3' miRNA 3' -CGUCUGCCGUGGCCCGGUCC-5'
miR-2-6184-3p, 6794, CDS, -117 kJ/mole, 90 %, 23 nt	mRNA 5' -CCACCUCCCCCUCCACCCCCUCC-3' miRNA 3' -AGUGGAGGAGGAGGUGAGGGACG-5'
miR-5-14114-5p, 6802, CDS, -123 kJ/mole, 89 %, 23 nt	mRNA 5' -CCCUCCACCCCUCCACCCCCAC-3' miRNA 3' -AGGAGGAGGGGAGGCAGGGCG-5'
miR-9-25681-5p, 10261, CDS, -102 kJ/mole, 87 %, 21 nt	mRNA 5' -CCAGCAGCAGCAGCAGCA-3' miRNA 3' -AGUCAUCGUCGUCCUCGUCGC-5'
miR-9-25681-5p, 10798, CDS, -102 kJ/mole, 87 %, 21 nt	mRNA 5' -UCAGCAGCAGCAGCAGCGA-3' miRNA 3' -AGUCAUCGUCGUCCUCGUCGC-5'
miR-X-48174-3p, 11207, CDS, -121 kJ/mole, 85 %, 24 nt	mRNA 5' -UCCCUGCGGGCGGGCGGGCGG-3' miRNA 3' -GGGGUCGCCGCCGCCGGGUC-5'
miR-9-20317-3p, 11225, CDS, -134 kJ/mole, 90 %, 24 nt	mRNA 5' -GGCGGUGGCGGGCGGGCGGC-3' miRNA 3' -CCGCCUCCGCCUCCGCCCGCG-5'
miR-6-12155-5p, 11462, CDS, -121 kJ/mole, 88 %, 22 nt	mRNA 5' -CCCCUCCCCGUCCGCCGCC-3' miRNA 3' -CGGGGAGGGGGCGGGCGGC-5'
miR-7-19687-3p, 15647, 3'UTR, -110 kJ/mole, 85 %, 23 nt	mRNA 5' -UCUUCAGGGGGAGGGGGCAAG-3' miRNA 3' -AGACGUCCUCCUCCCCUGAAC-5'

Supplementary table 4. Schematic representation of interaction of miRNA with 5'UTR, CDS, 3'UTR mRNA of *Mmu ZFHX3* gene

Gene, miRNA, site, region of mRNA, characteristics of binding	Scheme
miR-13-36375-5p, 4, 5'UTR, -115 kJ/mole, 87 %, 23 nt	mRNA 5'-GCCGCCGCGUGCCGCCAGCAGCGC-3' miRNA 3'-CGACGACGACGACGGUUGCCGU-5'
miR-3-8100-5p, 20, 5'UTR, -129 kJ/mole, 88 %, 24 nt	mRNA 5'-GCCGCCGCGUGCCGCCAGCAGCGC-3' miRNA 3'-CGACGACGACGACGGUUGCCGU-5'
miR-2-3313-3p, 21, 5'UTR, -138 kJ/mole, 87 %, 25 nt	mRNA 5'-CAGGCCGCGUGCAGCCGCCGCC-3' miRNA 3'-GCCCGGGCGGCAGCGGGCGGCCGG-5'
miR-2-3313-3p, 2418, CDS, -142 kJ/mole, 89 %, 25 nt	mRNA 5'-CGGGCCGCGGCCGCCGCCAGCU-3' miRNA 3'-GCCCGGGCGGCAGCGGGCGGCCGG-5'
miR-5-14114-5p, 6255, CDS, -123 kJ/mole, 89 %, 23 nt	mRNA 5'-UCCUCCGCCUCCCCCGCCUCCGC-3' miRNA 3'-AGGAGGAGGGGGAGGCAGGGGGCG-5'
miR-10-29282-3p, 12795, 3'UTR, -104 kJ/mole, 89 %, 23 nt	mRNA 5'-GUGUGUGUGUGUGUGUGUGUG-3' miRNA 3'-CACACACGCAUUAUACACACAU-5'
miR-10-29282-3p, 12797, 3'UTR, -104 kJ/mole, 89 %, 23 nt	mRNA 5'-GUGUGUGUGUGUGUGUGUG-3' miRNA 3'-CACACACGCAUUAUACACACAU-5'
miR-10-29282-3p, 12797, 3'UTR, -104 kJ/mole, 89 %, 23 nt	mRNA 5'-GUGUGUGUGUGUGUGUGUG-3' miRNA 3'-CACACACGCAUUAUACACACAU-5'
miR-10-29282-3p, 12801, 3'UTR, -104 kJ/mole, 89 %, 23 nt	mRNA 5'-GUGUGUGUGUGUGUGUGUG-3' miRNA 3'-CACACACGCAUUAUACACACAU-5'
miR-10-29282-3p, 12803, 3'UTR, -102 kJ/mole, 87 %, 23 nt	mRNA 5'-GUGUGUGUGUGUGUGUGUU-3' miRNA 3'-CACACACGCAUUAUACACACAU-5'
miR-10-29282-3p, 14501, 3'UTR, -102 kJ/mole, 87 %, 23 nt	mRNA 5'-AUGUGUGUGUGUGUGUGUA-3' miRNA 3'-CACACACGCAUUAUACACACAU-5'
miR-10-29282-3p, 14503, 3'UTR, -102 kJ/mole, 87 %, 23 nt	mRNA 5'-GUGUGUGUGUGUGUGUGUA-3' miRNA 3'-CACACACGCAUUAUACACACAU-5'
miR-101-27078-5p, 14950, 3'UTR, -106 kJ/mole, 88 %, 23 nt	mRNA 5'-ACACACACACACACACACA-3' miRNA 3'-UGUGUGUGCGUAUGUGUGCAUGU-5'

Supplementary table 5. Variability of amino acids encoded by the miR-2-8257-5p binding site in the mRNA of the orthologous *ZFHX3* genes

The region of <i>ZFHX3</i> protein with the oligopeptide, encoded by miRNA binding sites	Object
QTYMEHHC PGAR PPPPPPPPPPREESGSD	<i>Bin, Bta, Chi</i>
QTYMEHHC PGAR PPPPPPPPPP.REESRSD	<i>Oar</i>
QTYMEHHC PSARP PPP.....LREESASD	<i>Hsa, Nle, Pab, Ppa, Ptr, Sbo</i>
QTYMEHHC PSTR PPP.....LREESASD	<i>Csa, Mfa, Mml, Pro</i>
QTYMEHHC PGTR PPP.....LREESASD	<i>Cgr</i>
QTYMEHHC PGTH PPPA.....LREESASD	<i>Mmu, Rno</i>
QTYMEHHC PSARP PRP.....LREESGSD	<i>Ame, Cfa, Fca, Laf, Mda, Pti</i>

Note: Here and in the tables below oligopeptides encoded by the miRNA binding sites highlighted in bold type.

Supplementary table 6. The amino acid regions of *ZFHX3* orthologous proteins containing the octapeptide encoded by the miR-20-23817-3p binding site

The region of <i>ZFHX3</i> protein with the oligopeptide, encoded by miRNA binding sites	Object
MEGEEAL PAGSAAGP EQPQAGLL	<i>Aju, Ame, Csa, Cfa, Eca, Fca, Ggo, Har, Hgl, Hsa, Mfa, Nga, Nle, Pab, Ppa, Pti, Ptr, Rro, Rsi, Tch</i>
MEGEEAL PAGPAAGP EQPQAGIL	<i>Bac, Cfe, Lve, Pal</i>
MEGEEAL PAGPTAGP EQPQAGLL	<i>Bmu, Bta, Bin, Chi, Pho</i>

Supplementary table 7. Variability of amino acids encoded by miR-12-32603-3p binding sites in mRNAs of the orthologous *ZFHX3* genes

The region of <i>ZFHX3</i> protein with the oligopeptide, encoded by miRNA binding sites	Object
FSEKAEPAAEEAEFFFFDEEEEEEEVEEEEDEEEEEEEDEGCKGLF	<i>Bac</i>
FSEKAEPAAEEEVEEEEEEEAEEEEEDEEEEEEEDE.GCKGLF	<i>Cca</i>
FSEKAEPAAEEAEAAAAAEEEEEAEAAAAAEEEEEDE.GCKGLF	<i>Pal</i>
FSEKAEPAAEEEAEAAAAAEEEEEAEAAAAAEEEEEDE.GCKGLF	<i>Hgl</i>
FSEKVEPAEEEAEEEEEAEAAAAAEEEEEDEEEEEEEDE..GCKGLF	<i>Mmu</i>
FSEKAEPAAEEEAEAAAAAEEEEEAEAAAAAEEEEEDE..GCKGLF	<i>Cgr</i>
FSEKAEPAAEEEAEAAAAAEEEEEAEDEEEEEEEDE..GCKGLL	<i>Ame</i>
FSEKVEPAEEEAEEEEEAEAAAAAEEEEEDEEEEEEEDE..GCKGLF	<i>Sbo</i>
FSEKVEPAEEEAEEEEEAEAAAAAEEEEEDEEEEEEEDE..GCKGLF	<i>Csa, Ggo, Hsa, Mfa, Mml, Ptr</i>
FSEKAEPAAEEEAEAAAAAEEEEEAEAAAAAEEEEEDE..GCKGLF	<i>Aju, Cfa, Chi, Eca, Fca, Pti, Rsi, Ssc, Tch</i>
FSEKAEPAAEEEAEAAAAAEEEEEAEDEEEEEEEDE..GCKGLF	<i>Pho, Bmu, Bta</i>
FSEKVEPAEEEAEEEEEAEVEEEEEEEDEEEEEEEDE..GCKGLF	<i>Rro</i>
FSEKAEPAAEEEAEAAAAAEEEEEAEDEEEEEEEDE..GCKGLF	<i>Cfe</i>
FSEKAEPAAEEEAEAAAAAEEEEEVEEEEEEEDEEEEEEEDE..GCKGLF	<i>Oar</i>
FSEKVEPAEEEAEEEEEAEAAAAAEEEEEDEEEEEEEDE..GCKGLF	<i>Nle</i>
FSEKAEPAAEEEAEAAAAAEEEEEAEDEEEEEEEDE..GCKGLF	<i>Nga</i>
FSEKVEPAEEEAEEEEEAEAAAAAEEEEEDEEEEEEEDE..GCKGLF	<i>Rno</i>
FSEKAEPAAEEVEEEEEEEAEAAAAAEEEEEDEEEEEEEDE..GCKGLF	<i>Har</i>
FSEKVEPAEEEAEEEEEAEVEEEEEEEDEEEEEEEDE..GCKGLF	<i>Pab</i>
FSEKAEPAAEEEAEAAAAAEEEEEAEDEEEEEEEDE.....GCKGLF	<i>Laf</i>
FSEKVEPAEEEAEEEEEAEAAAAAEEEEEDEEEEEEEDE.....GCKGLF	<i>Ppa</i>

Supplementary table 8. Variability of amino acids encoded by miR-5-15733-3p, miR-9-20317-3p, miR-17-39416-3p binding sites in mRNA of the orthologous *ZFHX3* genes

The region of ZFHX3 protein with the oligopeptide, encoded by miRNA binding sites	Object
GGEQVFSH SAGAAAAAAAAAAAAAAN IGSTCGAPS	<i>Ami</i>
GGEQVFSH SAGAAAAAAAAAAAAAAN IGSSCGAPS	<i>Cfa</i>
GGEQVFSH TAGAAAAAAAAAAAAN ISSSCGAPS	<i>Cca, Ppa</i>
GGEQVFSH TAGAAAAAAAAAAAAN IGSTCGTPS	<i>Cja, Cmy, Phu, Gga</i>
GGEQVFSH TAGAAAAAVAAAAAAAN. ISSSCGAPS	<i>Hsa, Mfa, Ptr, Rro</i>
GGEQVFSH SAGAAAAAAAAAAAAN. IGSSCGAPS	<i>Fca, Laf, Mmu, Nga, Rno</i>
GGEQVFSH TAGAAAAAAAAAAAAN. ISSSCGAPS	<i>Csa, Ggo, Mml, Nle, Pab, Sbo</i>
GGEQVFSH TAGAAAAAAAAAAAAN. IGSSCGAPS	<i>Eca, Ssc</i>
GGEQVFSH TAGAAAAAVAAAAAAAN. ISGSCGAPS	<i>Hgl</i>
GGEQVFSH SAGAAAAAAAAAAAAN. IGGACGAPS	<i>Ocu</i>
GGEQVFSH TAGAAAAAVAAAAAAAN. ISSSCGAPS	<i>Har</i>
GGEQVFSH SAGAAAAAVAAAAAAAN. ISSSCGAPS	<i>Rsi</i>
GGEQVFSH TAGAAAAAAAAAAAAN. MGSSCGAPS	<i>Bmu, Bta, Chi</i>
GGEQVFSH TAGAAAAAATAAAAAAN. MGSSCGAPS	<i>Bin</i>

Supplementary table 9. Variability of amino acids encoded by miR-1322 binding sites in the mRNA of the orthologous ZFHX3 genes

Supplementary table 10. Variability of amino acids encoded by the miR-11-29856-3p binding site in the mRNA of the orthologous *ZFHX3* genes

The region of ZFHX3 protein with the oligopeptide, encoded by miRNA binding sites	Object
LLPHFPMTTETLLQLQQQQQHLLF	<i>Ggo</i>
LLPHFPMTATELLQLQQQQQHLLF	<i>Lve</i>
LLPHFPMTTETLLQLQQQQ . HLLF	<i>Acy, Aju, Ame, Ami, Apl, Bac, Bin, Bmu, Bta, Cca, Cdr, Cfa, Cfe, Cgr, Chi, Cja, Cmy, Csa, Eca, Eas, Epr, Fal, Fca, Fpe, Gga, Har, Hsa, Hgl, Laf, Mda, Mfa, Mml, Mmu, Oan, Oar, Ocu, Pab, Pal, Pho, Pma, Ppa, Pti, Ptr, Rbi, Rro, Rsi, Sbo, Ssc, Tch, Xtr, Uma</i>
LLPHFPMTTETLLQLQQHQ . HLLF	<i>Nga</i>
LLPHFPMTTETLLQLQQ . HHLLF	<i>Rno</i>

Supplementary table 11. Variability of amino acids encoded by miR-5-14114-5p, miR-2-6184-3p and miR-19-43437-5p binding sites in mRNA of the orthologous *ZFHX3* genes

The region of ZFHX3 protein with the oligopeptide, encoded by miRNA binding sites	Object
PLRPQTPEPPPPPPPPPPPPPPP.LPAAPPQP	<i>Laf</i>
PLRPQTPEPPPPPPPPPPPPP.Q.LPAAPPQQ	<i>Cfa</i>
PLRPQTPEPPPPPPPPPPPPP.Q.LPTAPPQP	<i>Fca</i>
PLRPQTPEPPPPPPPPPPPPP.Q.LPSAPPQP	<i>Pti</i>
PLRPQTPEPPPPPPPPPPPPP.Q.LPAAPPQP	<i>Ame, Uma</i>
PLRPQTPEPPPPPPPPPPPPP..LPAAPPQP	<i>Bac, Bin, Bta, Cgr, Chi, Csa, Hsa, Ssc, Ptr, Rro, Mda, Mfa, Mml, Ocu, Pab, Rno</i>
PLRPQTPEPPPPPPPPPPPPP..LPTAPPQP	<i>Mmu</i>
PLRPQTPEPPPPPPPPPPPPP..LPAAPPQA	<i>Eca</i>
PLRPQTPEPPPPPPPPPPPPP..LPPAPPQP	<i>Ami, Fpe, Gga</i>
PLRPQTPEPPPPPPPPPPPPP..LPTAPPQP	<i>Cmy</i>
PLRPQTPEPPPPPPPPPPP...LPAAPPQP	<i>Lve</i>
PLRPQTPEAPPPPPPPPPPPP...ATPQP	<i>Xtr</i>

Supplementary table 12. Variability of amino acids encoded by the miR-3692-5p binding site in the mRNA of the orthologous *ZFHX3* genes

The region of ZFHX3 protein with the oligopeptide, encoded by miRNA binding sites	Object
MPFMLFDPSNPLLASQLLSGAIPQ	<i>Aju, Ame, Bac, Bin, Bmu, Bta, Cca, Cfa, Cfe, Chi, Cdr, Cgr, Csa, Eas, Eca, Epr, Fca, Ggo, Har, Hgl, Hsa, Laf, Lve, Mda, Mfa, Mmu, Mml, Nga, Nle, Oan, Oar, Ocu, Pab, Pal, Pho, Ppa, Pti, Ptr, Rbi, Rno, Rro, Rsi, Sbo, Ssc, Tch, Uma</i>
MPFMLFDPSNPLLASQLLSGTLPO	<i>Acy, Ami, Apl, Cja, Cmy, Fal, Fpe, Gga, Phu, Pma</i>
MPFMLFDPSNPLLASQLLSGGLSQ	<i>Xtr</i>

Supplementary table 13. Variability of amino acids encoded by miR-1322 binding sites in mRNA of the orthologous ZFHX3 genes

The region of ZFHX3 protein with the oligopeptide, encoded by miRNA binding sites	Object
QQSLQEAIQQQQQQQQQQRQLQQQQQQQQQQQQ . KVQQQQQQQQQQ . PK	<i>Cgr</i>
QQSLQEAIQQQQQQQQQQRQLQQQQ KVQQ PK	<i>Laf</i>
QQSLQEAIQQQQQQQQZRQLQQQQQQQQ KVQQQQQQZ PK	<i>Rno</i>
QQSLQEAIQQQQQQQQZRQLQQQQQQQQ KVQQQQQQQ PK	<i>Mmu</i>
QQSLQEALQQQQQQQQ . RQLQQQ KVQQQQZ PK	<i>Oan</i>
QQSLQEALQQQQQQQQ . RQAQQQQQ KAQQ PK	<i>Fpe</i>
QQSLQEAIQQQQQQ . . RQLQQQQQ KVQQQ PK	<i>Nle</i>
QQSLQEAIQQQQQQ . . RQLQQQQQQ KVQQQ PK	<i>Fca</i>
QQSLQEAIQQQQQQ . . RQLQQQQQQ KVQQQ PK	<i>Hsa</i>
QQSLQEAIQQQQQQ . . RQLQQQQ PK	<i>Ptr</i>
QQSLQEAIQQQQQQ . . RQLQQQQQQ KVQQQ PK	<i>Rro</i>
QQSLQEAIQQQQQQ . . ROLQQQQQQ KVQQQQ PK	<i>Mfa, Mml</i>
QQSLQEAIQQQQQQ . . RQLQQQQQQ KVQQQQ PK	<i>Rbi</i>
QQSLQEAIQQQQQQ . . RQLQQQQQQ KVQQ PK	<i>Csa</i>
QQSLQEAIQQQQQQ . . RQLQQQQQQ KVQQQQ PK	<i>Ggo, Ppa</i>
QQSLQEAIQQQQQQ . . RQLQQQQQQ KVQQ PK	<i>Cfa</i>
QQSLQEAIQQQQQQ . . RQLQQQQQQQQ KVQQQQ PK	<i>Eca, Eas</i>
QQSLQEAIQQQQQQ . . RQLQQQQQQQQ KVQQQQ PK	<i>Ssc</i>
QQSLQEAIQQQQQQ . . RQLQQQQQQQQ KVQQ PK	<i>Har</i>
QQSLQEAIQQQQQQ . . RQLQQQQQQQQQQ KVQQQQ PK	<i>Hgl</i>
QQSLQEAIQQQQQQ . . RQLQQQQQQ KVQQQQ PK	<i>Cca</i>
QQSLQEAIQQQQQQ . . RQLQQQQQ KVQQ PK	<i>Ame</i>
QQSLQEALQQQQQQ . . RQLQQQQQ KVQQQQ PK	<i>Bta, Bin, Chi</i>
QQSLQEAIQQQQQQ . . RQLQQQQ KVQQQQQQQQZPQPK	<i>Pal</i>
QQSLQEAIQQQQQQ . . RQLQQQQ KVQQ PK	<i>Pti</i>
QQSLQEAIQQQQQQ . . RQMQQQQQQ KVQQQQQQ PK	<i>Nga</i>
QQSLQEAIQQQQQQ . . RQLQQQQQQQQQQ KVQQ PK	<i>Rsi</i>
QQSLQEPIQQQQQQ . . RQLQQQ KVQQ PK	<i>Bac</i>
QQSLQEALQQQQQQ . . RQLQQQQQ KVQQQQ PK	<i>Oar</i>
QQSLQEAIQQQQQQ . . RQLQQQQQQQQ KVQQQQ PK	<i>Epr</i>
QQSLQEALQQQQQQ . . RQLQQQQQ KVQQQQ PK	<i>Bmu, Pho</i>
QQSLQEAIQQQQQQ . . RQLQQQQQ KVQQQ PK	<i>Uma</i>
QQSLQEAIQQQQQQ . . RQMQQQQQQ KVQQQ PK	<i>Mda</i>
QQSLQEALQQQQQQ . . RQVQQQQQQQQQQ KVQQQQQQQQ PK	<i>Ami</i>
QQSLQEALQQQQ RQAQQQQQQQQQQ KAQQ PK	<i>Gga</i>
QQSLQEALQQQQ RQQQQQQQQQQQQQQQQKPKQQ PK	<i>Phu</i>
QQSLQEALQQQQ RQAQQQQQQQQQQ KAQQ PK	<i>Cja</i>
QQSLQEALQQQQ RQQQQQQQQQQQQQQXKPQQ PK	<i>Pma</i>
QQSLQEALQQQQ RQQQQQQQQ KPQQ PK	<i>Fal</i>
QQSLQEALQQQQ RQLQQQQ KQHHHHHQRLQQQQPK	<i>Xtr</i>
QQSLQEAIQQQQ RQLQQQQQQQ KVQQQQ PK	<i>Pab</i>
QQSLQEAIQQQQ RQLQQQQQQQQ KVQQQQQ PK	<i>Cfe</i>
QQSLQEAIQQQQ RQLQQQQQQQQ KVQQ PK	<i>Lve</i>
QQSLQEAIQQQQ RQLQQQQQQQQ KVQQQQQQ PK	<i>Cdr</i>
QQSLQEAIQQQQ KVQQQQQQQQ PK	<i>Ocu</i>

Note: in *Rno*, *Mmu*, *Oan* Z = 8Q and in *Pal* Z = 9Q, in *Pma* X = 18Q.

Supplementary table 14. Variability of amino acids encoded by miR-671-5p and miR-6779-5p binding sites in mRNA of the orthologous *ZFHX3* genes

The region of <i>ZFHX3</i> protein with the oligopeptide, encoded by miRNA binding sites	Object
QQPKASQ TPVPPGAP SPDKDPAK	<i>Hsa</i>
QQPKAS QTPVPPGAA SPDKDPAK	<i>Bmu, Bin, Bta, Cfa, Chi, Ggo, Har, Mda, Oar, Oan, Pab, Ppa, Ptr, Pho, Rsi, Sbo, Ssc</i>
QQPKAS QTPVPSGAA SPDKDPAK	<i>Csa, Mfa, Mml, Rbi, Rro</i>
QQPKAS QTPVPQGAA SPDKDPAK	<i>Aju, Ame, Bac, Cca, Cdr, Cfe, Cgr, Eca, Eas, Epr, Fca, Hgl, Laf, Lve, Ocu, Pt, Uma</i>
QQPKAS QTPVPQGPA SPDKDPAK	<i>Mmu, Rno</i>
PQPKAS QTPVPPGAA SPDKDPAK	<i>Pal</i>
QQPKAS QTPVPQGAT SPDKDPAK	<i>Nga</i>
QQPKGS QTPVPAGAA TPDKDPAK	<i>Acy, Ami, Apl, Cja, Fal, Fpe, Gga, Phu, Pma</i>
QQPKAS QTPVPPGAA SPDKDPAK	<i>Nle</i>

Supplementary table 15. Variability of amino acids encoded by miR-17-39416-3p, miR-9-20317-3p, miR-1-1819-3p, miR-5-15733-3p, miR-6-17815-3p, miR-18-39953-5p, miR-2-6862-5p, miR-1260b and miR-X-48174-3p binding sites in mRNA of the orthologous *ZFHX3* genes

The region of <i>ZFHX3</i> protein with the oligopeptide, encoded by miRNA binding sites	Object
EMVLHVPTGGGGSGSGGGNGSGGGNGGGGSYHCLACES	<i>Laf</i>
EMVLHVPTGGGGGGSGGGGGGGGGGGGGGGGG . . . YHCLACES	<i>Hsa</i>
EMVLHVPTGGGSGGGGGGGGGGGGGGGGGGGGGGGG . . . YHCLACES	<i>Csa</i>
EMVLHVPTGGGSGGGGGGGGGGGGGGGGGGGG . . . YHCLACES	<i>Cfe</i>
EMVLHVPTGGGGGGGGGGGGGGGGGGGGGGGGGG . . . YHCLACES	<i>Ptr</i>
EMVLHVPTGGGGGGGGGGGGGGGGGGGGGGGGGG . . . YHCLACES	<i>Pab</i>
EMVLHVPTGGGGGGGGGGGGGGGGGGGGGGGGGG . . . YHCLACES	<i>Cfa</i>
EMVLHVPTGGGGGGGGGGGGGGGGGGGGGGGGGG . . . YHCLACES	<i>Rro</i>
EMVLHVPTGGGGGGGGGGGGGGGGGGGGGGGGGG . . . YHCLACES	<i>Cca</i>
EMVLHVPTGGGSGGGGGGGGGGGGGGGGGGGG . . . YHCLACES	<i>Eca</i>
EMVLRVPTGGGGGGGGGGGGGGGGGGGGGGGG . . . YHCLACES	<i>Har</i>
EMVLHVPTGGGSGGGGGGGGGGGGGGGGGG . . . YHCLACES	<i>Mfa, Mml</i>
EMVLHVPTGGGGGGGGGGGGGGGGGGGGGGGG . . . YHCLACES	<i>Mmu</i>
EMVLHVPTGGGGGGGGGGGGGGGGGGGGGGGG . . . YHCLACES	<i>Rno</i>
EMVLHVPTGGGGGGGGGGGGGGGGGGGGGGGG . . . YHCLACES	<i>Nga</i>
EMVLHVPTGGGGGGGGGGGGGGGGGGGGGGGG . . . YHCLACES	<i>Mda</i>
EMVLHVPTGGGSGGGGGGGGGGGGGGGGGGGG . . . YHCLACES	<i>Fca</i>
EMVLHVPTGGGGGGGGGGGGGGGGGGGGGGGG . . . YHCLACES	<i>Nle</i>
EMVLHVPTGGGGGGGGGGGGGGGGGGGGGGGG . . . YHCLACES	<i>Lve</i>
EMVLHVPTGGGGSGGGGGGGGGGGGGGGGG . . . YHCLACES	<i>Ame</i>
EMVLHVPTGGGGGGGGGGGGGGGGGGGGGGGG . . . YHCLACES	<i>Sbo</i>
EMVLHVPTGGGGGGGGGGGGGGGGGGGGGGGG . . . YHCLACES	<i>Bin, Bta, Chi</i>
EMVLHVPTCGGGGGGGGGGGGGGGGGGGGGGG . . . YHCLACES	<i>Hgl</i>
EMVLHVPTGGGGGGGGGGGGGGGGGGGGGGGG . . . YHCLACES	<i>Ocu</i>
EMVLHVPTSSGGGGGGGGGGGGGGGGGGGGGG . . . YHCLACES	<i>Cgr</i>
EMVLHVPTGGGGSGGGGGGGGGGGGGGGGGGG . . . YHCLACES	<i>Bac</i>

Supplementary table 16. Variability of amino acids encoded by miR-19-21199-3p, miR-1-2770-3p, miR-1-2121-3p, miR-19-33623-3p, miR-5-14114-5p, miR-3960 and miR-2-6184-3p binding sites in mRNA of the orthologous *ZFHX3* genes

The region of <i>ZFHX3</i> protein with the oligopeptide, encoded by miRNA binding sites	Object
SAAHSNDS PPPPSAAAPSSSSASP HAS	<i>Chi, Eca, Ocu, Pho</i>
SAAHSNDS PPXPSAAAPSSSSASP . HAS	<i>Tch</i>
SAAHSNDS PPPPSAAAPSSSSASP .. HAS	<i>Bin, Bmu, Bta, Cfa, Fca, Har, Pal, Pti, Uma</i>
SAAHSNDS PPPLSAAAPSSSSASP .. HAS	<i>Bac</i>
SAAHSNDS PPPLSAAAPSSFSASP .. HAS	<i>Lve</i>
SAAHSNDS PPPQSAAAPSSSSASP .. HAS	<i>Mda</i>
SAAHSNDS PPPPSAAAPSSSASP .. HAS	<i>Hgl</i>
SAAHSNDS PPPPSAA. PSSSASP .. HAS	<i>Mmu, Rno</i>
SAAHSNDS PPPLA. PSSSASP .. HAS	<i>Cgr</i>
SAAHSNDS PPPPSAAAPSSASP HAS	<i>Ggo, Hsa, Ptr, Ppa, Sbo</i>
SAAHSNDS PPPPSAATPSSASP HAS	<i>Csa, Mfa, Mml, Rro</i>
SAAHSNDS PPPPSAAAPPSASP HAS	<i>Laf</i>
SAAHTNDS PPPSLSSSSASP HAS	<i>Ami</i>
SAAHSNDS PPPPRPPPASP HAS	<i>Cja, Gga, Phu</i>

Note: X – *Tch* PSP.