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Supplemental Data

Supplementary Figure 1. Previously unpublished conserved uORF sequences in the mRNA of AdoMetDC genes from eukaryotes. The full species names are given on the left. The corresponding peptide sequence is shown in the middle in single letter code. The RNA sequence is on the right-hand side. The consensus sequence in each case is given below the alignment. Non-synonymous changes are highlighted in light blue, synonymous changes in the RNA sequences are highlighted in gray. Absolutely conserved residues are indicated by “*” below each alignment. The initiation codon is highlighted in green and the termination in red. A) The conserved uORF in the 5 leader of AdoMetDC in Pezizomycotina. B) The conserved uORF in the 5 leader of AdoMetDC in nematodes.

A.

Coccidioides posadasii
Coccidioides immitis
Ajellomyces capsulatus
Paracoccidioides brasiliensis
Sclerotinia sclerotiorum
Uncinocarpus reesii
Botryotinia fuckeliana
Aspergillus nidulans
Aspergillus fumigatus
Aspergillus terreus
Aspergillus flavus
Aspergillus oryzae
Aspergillus niger
Pyrenophora tritici
Neosartorya fischeri
Neurospora crassa
Penicillium marneffei
Phaeosphaeria nodorum
Trichophyton rubrum
Thermomyces lanuginosus
Mycosphaerella graminicola
Mycosphaerella fijiensis
Cercospora zeae-maydis
Cochliobolus heterostrophus
Chaetomium globosum

[illegible]

UCUCUCUUGAGCCGCGAAGGACUCUACGAAUUUCUUAUGCAAGGUCUGCAAAACCGCAGAAUA
 CUCUCUUGAGCCGGAAGGACACUCUACGAAUUUCUUAUGCAAGGUCUGCAAAACCGCAGAAUA
 CUCUCUUGAGCCGUAAGGAAGAUUCUCUGCGAAUUUCUUCGAAAGCCGCGAAACCCUGCAUAA
 CUCUCUUGAGCCGCGGAAGGAUCUCUACGAAUUUCUUCGAAAGCCGCGGAACCCGAGAAUA
 UCUCUUGAGAGCAUCAAAGAUUAUCUACGCUUCUUUCUUAAGGCAAGCAAGGCCUGCAUAA
 CUCUCUUGAGCCGGAAGGACUCUCUGCGAAUUUCUUCGAAAGCCGCGAAACCCGAGAAUA
 UUCUCUUGAGAGCAUCAAAGAUUAUCUACGCUUCUUUCUUAAGCAAGCAAGGCCUGCAUAA
 CUCUUCUUGAGCAUCAGAGGACUUCUGCGAAUUUCUGUCCAGGCGUGGGAAGGCCUGCAUAA
 CCUCUUCUUGAAGCAAGGAGCAUUGUCGCGUUUCUGUUAAGGCAAGCAAGGCCUGCAUAA
 CCUUCUUCUUGAAGCAAGGACUUCUGCGAAUUUCUGUUAAGGCGUGGGAAGGCCUGCAUAA
 CUCUUCUUGAGGCCGCGAGGAUUCUACGCGAUAACUGUUCCAAGGCGUGGGAAGGCCUGCAUAA
 CCUUCUUCUUGAGCCCGAAGGAUUCUACGCGAUAACUGUUCCAAGGCGUGGGAAGGCCUGCAUAA
 CCUCUUCUUGAAGCCGGAAGGAUUCUACGCGAUAACUGUUCUUAAGGCGUGGGAAGGCCUGAAUA
 UCUCUUCUUGGCUUGCGAGGACGUGAGCUCUUCUGUCCAGGCGUGGGAAGGCCUGCAUAA
 CCUCUUCUUGAAGCAAGGAGCAUUGUCGCGAAUUUCUGUUAAGGCAAGCAAGGCCUGCAUAA
 CGCCUCCUUGAGAGCAUCCAGGACUUCUUCGCUUCUGUCCAGGCGUGGGAAGGCCUGAAUA
 CCUCUUCUUGAGGCCGGAAGGACUACUACGUUUCUGUUAAGGCGUGGGAAGGCCUGCAUAA
 UCUCUUCUUGGCUUGCGAGGACUUCGAGCUCUUCUGUCCAGGCGUGGGAAGGCCUGCAUAA
 CCUCUCCUUGAGUCUGUAAGGACUGUACGCUUCUUAUCCAGGCAAGCAAAACCGCAGAAUA
 UCUCUUCUUGAGCCGGAAGGACUCUUCUACGCUUCUCCAGGCGUGGCGAAACCGCAGAAUA
 CAUUCUUCUUGCCUCCGAGAUAUCUUCGCGGUUCUUGUCUGUCCAAAGAGGCCGAGAAUA
 CCUCUUCUUGGSGCUCAGAGAGACUUCUUCGCGCCUUCUGCAGGCCCAAGAGGCCUGAGAAUA
 CGUUCUUCUUGGSGCCAGAGAACUUCUUCAGAGCAAGCAGGCCUGCAAGGCCUGAGAAUA
 UAUUCUUCUUGGCGCGAGGACGUGGAGCUCUUCUGUCCUACGCGUGGGAAGGCCUGAGAAUA
 CGGCCAUCUAGCCGCGAUUAUCUUCGCGAAUUCUCCAGGCGAGCAAGAACCGUAGAAUA

Consensus

MSPKDLLRFLSKPAKPR

AUGAGCCCGAAGGACCUGCUACGAUCCUGUCCAAGCCUGCAAAGCCUCGAUAA

B.

Caenorhabditis remanei
Caenorhabditis elegans
Caenorhabditis briggsae
Caenorhabditis japonica
Caenorhabditis brenneri
Ancylostoma caninum
Ancylostoma ceylanicum
Teladorsagia circumcincta
Heterorhabditis bacteriophora

MGPDRKTRILVLVYRRPP
MGPDRKTRILVLVYRRPP
MGPDRKTRILVLVYRRPP
MGPDQKTRILVLVYRRPP
MGPERKTRILVLVYRRPP
MGPD**I**ETLILVLVYRRPP
MGPD**I**ETLILVLVYRRPP
MGPD**I**ETLILVLVYRRPP
MGPD**I**ETLILVLVYRRPP
MGPD**E**ALILVLVYRRPP

[illegible]

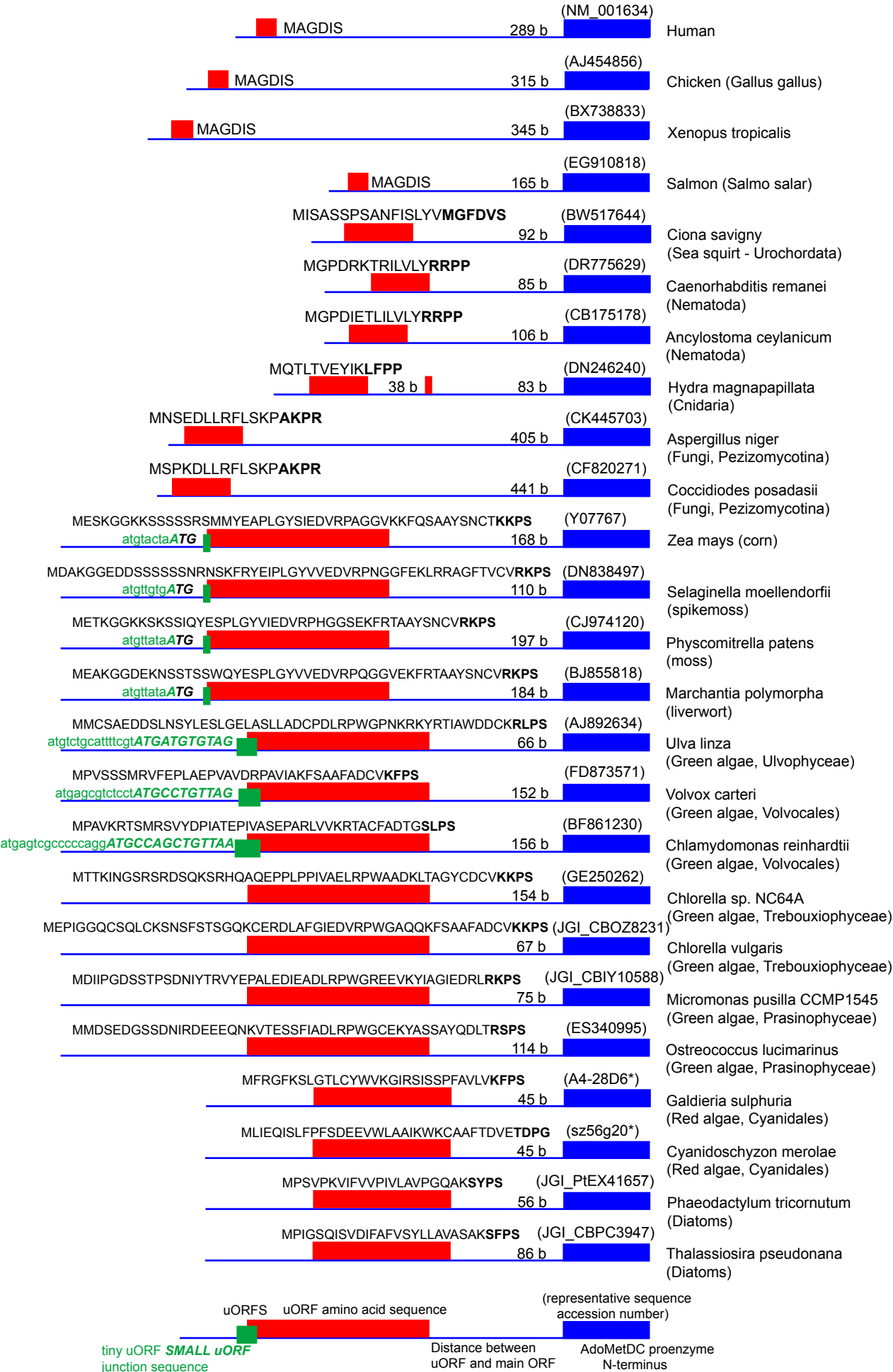
Consensus

MGPDRKTRILVLYRRPP

AUGGGUCCAGACCGUAAGACCCGCAUCCUCGUCCUCUACCGUCGUCCUCCUAG

Supplementary Figure 2. Schematic representation of the 5' leaders of AdoMetDC mRNAs with conserved uORFs. uORFs are shown as rectangular red boxes. Their amino acid sequences are indicated above each box. The "tiny" uORFs in plants are shown rectangular green boxes. Their nucleotide sequences are shown in front. The beginning of the main ORFs are shown as rectangular blue boxes. Species names are given on the right. "b" = bases

Supplementary Figure 2



Supplementary Figure 3. The nucleotide sequences of SpmSyn mRNAs surrounding the newly described uORFs in vertebrates. The full species names are given on the left. Absolutely conserved nucleotides are indicated by “*” below the alignment. The initiation codon of the uORF is highlighted in green and the termination codon in red. The initiation codon of the main ORF is highlighted in light blue.

Supplementary Figure 3

Macia amibis	CCC	CCAGGCG	ATG	GCACGGGGCUC	GCUCACUAU	AUG	GCAGCAGC	ACGGCA	CAG	CAGCUC	UGA	UCU	CAUUG	UCUGCG	CCAAAG	CGAU	GUG	UGAG	GAGCA	CAUUC	UAA	AGGC	CCU	CAGU	CAUUUU	UUC	CAGGAG	CAGGGA	GAUG
Papilio fascicularis	CCC	CCAGGCG	ATG	GCACGGGGCUC	GCUCACUAU	AUG	GCAGCAGC	ACGGCA	CAG	CAGCUC	UGA	UCU	CAUUG	UCUGCG	CCAAAG	CGAU	GUG	UGAG	GAGCA	CAUUC	UAA	AGGC	CCU	CAGU	CAUUUU	UUC	CAGGAG	CAGGGA	GAUG
Pan troglodytes	CCC	CCAGGCG	ATG	GCACGGGGCUC	GCUCACUAU	AUG	GCAGCAGC	ACGGCA	CAG	CAGCUC	UGA	UCU	CAUUG	UCUGCG	CCAAAG	CGAU	GUG	UGAG	GAGCA	CAUUC	UAA	AGGC	CCU	CAGU	CAUUUU	UUC	CAGGAG	CAGGGA	GAUG
Homo sapiens	CCC	CCAGGCG	ATG	GCACGGGGCUC	GCUCACUAU	AUG	GCAGCAGC	ACGGCA	CAG	CAGCUC	UGA	UCU	CAUUG	UCUGCG	CCAAAG	CGAU	GUG	UGAG	GAGCA	CAUUC	UAA	AGGC	CCU	CAGU	CAUUUU	UUC	CAGGAG	CAGGGA	GAUG
Canis familiaris	CCC	CCAGGCG	ATG	GCACGGGGCUC	GCUCACUAU	AUG	GCAGCAGC	ACGGCA	CAG	CAGCUC	UGA	UCU	CAUUG	UCUGCG	CCAAAG	CGAU	GUG	UGAG	GAGCA	CAUUC	UAA	AGGC	CCU	CAGU	CAUUUU	UUC	CAGGAG	CAGGGA	GAUG
Capra hircus	CCC	CCAGGCG	ATG	GCACGGGGCUC	GCUCACUAU	AUG	GCAGCAGC	ACGGCA	CAG	CAGCUC	UGA	UCU	CAUUG	UCUGCG	CCAAAG	CGAU	GUG	UGAG	GAGCA	CAUUC	UAA	AGGC	CCU	CAGU	CAUUUU	UUC	CAGGAG	CAGGGA	GAUG
Ovis aries	CCC	CCAGGCG	ATG	GCACGGGGCUC	GCUCACUAU	AUG	GCAGCAGC	ACGGCA	CAG	CAGCUC	UGA	UCU	CAUUG	UCUGCG	CCAAAG	CGAU	GUG	UGAG	GAGCA	CAUUC	UAA	AGGC	CCU	CAGU	CAUUUU	UUC	CAGGAG	CAGGGA	GAUG
Bos Taurus	UCC	CCAGGCG	ATG	GCACGGGGCUC	GCUCACUAU	AUG	GCAGCAGC	ACGGCA	CAG	CAGCUC	UGA	UCU	CAUUG	UCUGCG	CCAAAG	CGAU	GUG	UGAG	GAGCA	CAUUC	UAA	AGGC	CCU	CAGU	CAUUUU	UUC	CAGGAG	CAGGGA	GAUG
Mus musculus	UCC	CCAGGCG	ATG	GCACGGGGCUC	GCUCACUAU	AUG	GCAGCAGC	ACGGCA	CAG	CAGCUC	UGA	UCU	CAUUG	UCUGCG	CCAAAG	CGAU	GUG	UGAG	GAGCA	CAUUC	UAA	AGGC	CCU	CAGU	CAUUUU	UUC	CAGGAG	CAGGGA	GAUG
Rattus norvegicus	UCC	CCAGGCG	ATG	GCACGGGGCUC	GCUCACUAU	AUG	GCAGCAGC	ACGGCA	CAG	CAGCUC	UGA	UCU	CAUUG	UCUGCG	CCAAAG	CGAU	GUG	UGAG	GAGCA	CAUUC	UAA	AGGC	CCU	CAGU	CAUUUU	UUC	CAGGAG	CAGGGA	GAUG
Peromyscus polionotus	UCC	CCAGGCG	ATG	GCACGGGGCUC	GCUCACUAU	AUG	GCAGCAGC	ACGGCA	CAG	CAGCUC	UGA	UCU	CAUUG	UCUGCG	CCAAAG	CGAU	GUG	UGAG	GAGCA	CAUUC	UAA	AGGC	CCU	CAGU	CAUUUU	UUC	CAGGAG	CAGGGA	GAUG
Gallus gallus	CTU	CCAGGCG	ATG	GCACGGGGCUC	ACUCACUAU	AUG	GCAGCAGC	CGGCGA	CAG	CAGCUC	UGA	UCU	CAUUG	UCUGCG	CCAAAG	CGAU	GUG	UGAG	GAGCA	CAUUC	UAA	AGGC	CCU	CAGU	CAUUUU	UUC	CAGGAG	CAGGGA	GAUG
Anas platyrhynchos	CCU	CCAGGCG	ATG	GCACGGGGCUC	ACUCACUAU	AUG	GCAGCAGC	CGGCGA	CAG	CAGCUC	UGA	UCU	CAUUG	UCUGCG	CCAAAG	CGAU	GUG	UGAG	GAGCA	CAUUC	UAA	AGGC	CCU	CAGU	CAUUUU	UUC	CAGGAG	CAGGGA	GAUG
Taeniopygia guttata	GCU	CCAGGCG	ATG	GCACGGGGCUC	ACUCACUAU	AUG	GCAGCAGC	CGGCGA	CAG	CAGCUC	UGA	UCU	CAUUG	UCUGCG	CCAAAG	CGAU	GUG	UGAG	GAGCA	CAUUC	UAA	AGGC	CCU	CAGU	CAUUUU	UUC	CAGGAG	CAGGGA	GAUG
Agkistrodon piscivorus	CCA	CCAGGCG	ATG	GCACAGAGCUC	UCCUACUAU	AUG	GCAGCAGC	CGGCGA	CAG	CAGCUC	UGA	UCU	CAUUG	UCUGCG	CCAAAG	CGAU	GUG	UGAG	GAGCA	CAUUC	UAA	AGGC	CCU	CAGU	CAUUUU	UUC	CAGGAG	CAGGGA	GAUG
Xenopus laevis	CCU	CCAGGCG	ATG	GCACAGCUC	ACUCACUAU	AUG	GCAGCAGC	CGGCGA	CAG	CAGCUC	UGA	UCU	CAUUG	UCUGCG	CCAAAG	CGAU	GUG	UGAG	GAGCA	CAUUC	UAA	AGGC	CCU	CAGU	CAUUUU	UUC	CAGGAG	CAGGGA	GAUG
Xenopus tropicalis	CCU	CCAGGCG	ATG	GCACAGCUC	ACUCACUAU	AUG	GCAGCAGC	CGGCGA	CAG	CAGCUC	UGA	UCU	CAUUG	UCUGCG	CCAAAG	CGAU	GUG	UGAG	GAGCA	CAUUC	UAA	AGGC	CCU	CAGU	CAUUUU	UUC	CAGGAG	CAGGGA	GAUG
Trichorus vulpcula	CCA	CCAGGCG	ATG	GCACAGCUC	ACUCACUAU	AUG	GCAGCAGC	CGGCGA	CAG	CAGCUC	UGA	UCU	CAUUG	UCUGCG	CCAAAG	CGAU	GUG	UGAG	GAGCA	CAUUC	UAA	AGGC	CCU	CAGU	CAUUUU	UUC	CAGGAG	CAGGGA	GAUG
Gasterosteus aculeatus	AUUC	CCAGGCG	ATG	GAUAGCGGUGUC	ACUCAGACAU	UGG	AGCAGU	CGGCGA	CAG	CAGCUC	UGA	UCU	CAUUG	UCUGCG	CCAAAG	CGAU	GUG	UGAG	GAGCA	CAUUC	UAA	AGGC	CCU	CAGU	CAUUUU	UUC	CAGGAG	CAGGGA	GAUG
Hippoglossus hippoglossus	AUU	CCAGGCG	ATG	GAUAGCGGUGUC	AGUAGACAU	UGG	AGCAGU	CGGCGA	CAG	CAGCUC	UGA	UCU	CAUUG	UCUGCG	CCAAAG	CGAU	GUG	UGAG	GAGCA	CAUUC	UAA	AGGC	CCU	CAGU	CAUUUU	UUC	CAGGAG	CAGGGA	GAUG
Thunnus thynnus	AUU	CCAGGCG	ATG	GAUAGCGGUGUC	ACUCAGACAU	UGG	AGCAGU	CGGCGA	CAG	CAGCUC	UGA	UCU	CAUUG	UCUGCG	CCAAAG	CGAU	GUG	UGAG	GAGCA	CAUUC	UAA	AGGC	CCU	CAGU	CAUUUU	UUC	CAGGAG	CAGGGA	GAUG
Orzyias latipes	UUU	CCAGGCG	ATG	GAUAGCGGUGUC	AGUAGACAU	UGG	AGCAGU	CGGCGA	CAG	CAGCUC	UGA	UCU	CAUUG	UCUGCG	CCAAAG	CGAU	GUG	UGAG	GAGCA	CAUUC	UAA	AGGC	CCU	CAGU	CAUUUU	UUC	CAGGAG	CAGGGA	GAUG
Balaenoptera musculus	CAU	CCAGGCG	ATG	GAUAGCGGUGUC	AGUAGACAU	UGG	AGCAGU	CGGCGA	CAG	CAGCUC	UGA	UCU	CAUUG	UCUGCG	CCAAAG	CGAU	GUG	UGAG	GAGCA	CAUUC	UAA	AGGC	CCU	CAGU	CAUUUU	UUC	CAGGAG	CAGGGA	GAUG
Danio rerio	CAU	CCAGGCG	ATG	GAUAGCGGUGUC	AGUAGACAU	UGG	AGCAGU	CGGCGA	CAG	CAGCUC	UGA	UCU	CAUUG	UCUGCG	CCAAAG	CGAU	GUG	UGAG	GAGCA	CAUUC	UAA	AGGC	CCU	CAGU	CAUUUU	UUC	CAGGAG	CAGGGA	GAUG
Piemphales promelas	CAU	CCAGGCG	ATG	GAUAGCGGUGUC	AGUAGACAU	UGG	AGCAGU	CGGCGA	CAG	CAGCUC	UGA	UCU	CAUUG	UCUGCG	CCAAAG	CGAU	GUG	UGAG	GAGCA	CAUUC	UAA	AGGC	CCU	CAGU	CAUUUU	UUC	CAGGAG	CAGGGA	GAUG
Ictalurus furcatus	UCU	CCAGGCG	ATG	GAUAGCGGUGUC	AGUAGACAU	UGG	AGCAGU	CGGCGA	CAG	CAGCUC	UGA	UCU	CAUUG	UCUGCG	CCAAAG	CGAU	GUG	UGAG	GAGCA	CAUUC	UAA	AGGC	CCU	CAGU	CAUUUU	UUC	CAGGAG	CAGGGA	GAUG
Ictalurus punctatus	UCU	CCAGGCG	ATG	GAUAGCGGUGUC	AGUAGACAU	UGG	AGCAGU	CGGCGA	CAG	CAGCUC	UGA	UCU	CAUUG	UCUGCG	CCAAAG	CGAU	GUG	UGAG	GAGCA	CAUUC	UAA	AGGC	CCU	CAGU	CAUUUU	UUC	CAGGAG	CAGGGA	GAUG
Salmo salar	ACU	CCAGGCG	ATG	GAUAGCGGUGUC	AGUAGACAU	UGG	AGCAGU	CGGCGA	CAG	CAGCUC	UGA	UCU	CAUUG	UCUGCG	CCAAAG	CGAU	GUG	UGAG	GAGCA	CAUUC	UAA	AGGC	CCU	CAGU	CAUUUU	UUC	CAGGAG	CAGGGA	GAUG
Inconorhynchus mykiss	ACU	CCAGGCG	ATG	GAUAGCGGUGUC	AGUAGACAU	UGG	AGCAGU	CGGCGA	CAG	CAGCUC	UGA	UCU	CAUUG	UCUGCG	CCAAAG	CGAU	GUG	UGAG	GAGCA	CAUUC	UAA	AGGC	CCU	CAGU	CAUUUU	UUC	CAGGAG	CAGGGA	GAUG
Osmorus mordax	UUU	CCAGGCG	ATG	GAUAGCGGUGUC	AGUAGACAU	UGG	AGCAGU	CGGCGA	CAG	CAGCUC	UGA	UCU	CAUUG	UCUGCG	CCAAAG	CGAU	GUG	UGAG	GAGCA	CAUUC	UAA	AGGC	CCU	CAGU	CAUUUU	UUC	CAGGAG	CAGGGA	GAUG
		*****				*****																							
		uORF				main ORF																							

Supplementary Figure 4. Schematic representation of the newly described uORFs in vertebrate SSAT mRNAs. The discrete “uORF1” is shown as rectangular red box. The overlapping “uORF2” shown as rectangular yellow box. The main ORF is shown as rectangular blue box. “b” = bases; “a.a” = “amino acids”

Supplementary Figure 4

