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# Ribosome profiling reveals resemblance between long non-coding RNAs and 5' leaders of coding RNAs

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## SUMMARY

Large-scale genomics and computational approaches have identified thousands of putative long non-coding RNAs (lncRNAs). It has been controversial, however, as to what fraction of these RNAs is truly non-coding. Here, we combine ribosome profiling with a machine-learning approach to validate lncRNAs during zebrafish development in a high throughput manner. We find that dozens of proposed lncRNAs are protein-coding contaminants and that many lncRNAs have ribosome profiles that resemble the 5' leaders of coding RNAs. Analysis of ribosome profiling data from embryonic stem cells reveals similar properties for mammalian lncRNAs. These results clarify the annotation of developmental lncRNAs and suggest a potential role for translation in lncRNA regulation. In addition, our computational pipeline and ribosome profiling data provide a powerful resource for the identification of translated open reading frames during zebrafish development.

**KEY WORDS:** Long non-coding RNAs, Ribosome profiling, Embryogenesis, Zebrafish, ES cells

## INTRODUCTION

Long non-coding RNAs (lncRNAs) have emerged as important regulators of gene expression during development (Pauli et al., 2011; Rinn and Chang, 2012). lncRNAs were initially discovered for their essential roles in imprinting (Barlow et al., 1991; Bartolomei et al., 1991; Jinno et al., 1995; Sleutels et al., 2002) and mammalian X chromosome inactivation (Borsani et al., 1991; Brockdorff et al., 1992; Brown et al., 1992). Studies of Hox gene regulation in mammals and of flowering control in plants have identified additional lncRNAs, such as *HOTTIP* (Wang et al., 2011) and *COOLAIR* (Ietswaart et al., 2012; Swiezewski et al., 2009). The past decade has seen an explosion of genome-wide studies that have identified thousands of putative lncRNAs in a range of organisms (Bertone et al., 2004; Cabili et al., 2011; Carninci et al., 2005; Collins et al., 2012; Derrien et al., 2012; Djebali et al., 2012; Birney et al., 2007; Fejes-Toth et al., 2009; Guttman et al., 2009; Guttman et al., 2010; Kapranov et al., 2002; Kapranov et al., 2007; Okazaki et al., 2002; Pauli et al., 2012; Ravasi et al., 2006; Tilgner et al., 2012). Although the developmental roles of the vast majority of these novel transcripts are unknown, recent studies in zebrafish and embryonic stem cells (ESCs) have indicated roles for lncRNAs during embryogenesis, pluripotency and differentiation (Guttman et al., 2011; Ulitsky et al., 2011).

A prerequisite for the functional analysis of lncRNAs is the high-confidence annotation of this class of genes as truly non-coding. The distinction of lncRNAs from coding mRNAs has often relied on the computational classification of expressed transcripts (Dinger et al., 2008; Guttman and Rinn, 2012). These classifiers evaluate

transcript features, such as open reading frame (ORF) lengths, coding potential, and protein sequence conservation. Such computational approaches can distinguish between coding RNAs and lncRNAs (Cabili et al., 2011; Carninci et al., 2005; Guttman et al., 2009; Pauli et al., 2012; Ulitsky et al., 2011), but may also give rise to misclassifications: lncRNAs containing short conserved regions might be misclassified as protein-coding (false negatives), whereas protein-coding transcripts containing short or weakly conserved ORFs might be misclassified as non-coding (false positives). For example, two recent zebrafish lncRNA catalogs (Pauli et al., 2012; Ulitsky et al., 2011) share little overlap, suggesting that novel approaches are needed to distinguish coding from non-coding RNAs.

One approach to detect potential coding sequences is ribosome profiling (Ingolia et al., 2009; Ingolia et al., 2012). In this method, mRNA fragments protected from RNaseI digestion by cycloheximide (CHX)-stalled 80S ribosomes are isolated and sequenced. The resultant ribosome-protected fragments (RPFs) correspond to the sites where translating ribosomes resided on mRNA transcripts at the time of isolation, yielding a quantitative, genome-wide snapshot of translation at nucleotide (nt) resolution. Application of this method to mouse embryonic stem cells (mESCs) detected RPFs associated with many previously annotated lncRNAs (Ingolia et al., 2011). This study suggested that the majority of annotated lncRNAs contain highly translated regions comparable to protein-coding genes and might encode proteins. However, translation of a transcript was inferred by measuring localized densities of ribosome profiling reads relative to expression (translational efficiency; TE). As shown below, we find that this approach does not reliably distinguish the main ORFs (coding sequences; CDSs) from upstream ORFs (uORFs). This distinction is important because the vast majority of uORFs are unlikely to code for functional peptide products because their peptide sequences are not conserved, even though their presence in the 5' leader may be (Hood et al., 2009). Indeed, a recent peptidomics study suggested that most annotated lncRNAs do not generate stable protein products (Bánfalvi et al., 2012). It has therefore remained unclear what fraction of currently annotated putative lncRNAs are truly non-coding.

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Here, we address the issue of lncRNA annotation by combining ribosome profiling during early zebrafish development with a new machine-learning approach. Our study suggests that dozens of previously annotated lncRNAs are protein-coding contaminants. In addition, we find that many lncRNAs in zebrafish and ESCs resemble the 5' leaders of coding mRNAs, raising the possibility that translation is involved in lncRNA regulation. The methods and datasets provided in this study provide a broad resource for the identification of translated ORFs during zebrafish development.

## MATERIALS AND METHODS

### Ribosome profiling

Ribosome profiling was adapted from Ingolia et al. (Ingolia et al., 2011) and applied to a zebrafish developmental time course. For each stage [2–4 cells, 256 cells, 1000 cells, dome, shield, bud, 28 hours post fertilization and 5 days post fertilization (Kimmel et al., 1995)], 400–600 embryos were washed with cold PBS, flash-frozen and stored at –80°C. Embryos were lysed by repeated micropipetting in 1.5 ml of cold polysome buffer (20 mM Tris-HCl pH 7.4, 250 mM NaCl, 15 mM MgCl<sub>2</sub>, 1 mM dithiothreitol, 100 µg/ml CHX) with added 0.5% Triton X-100, 500 µg/ml guanosine 5'-[β,γ-imido]triphosphate (GMP-PNP), 24 U/ml TurboDNase (Ambion AM2238), then incubated with agitation for 10 minutes at 4°C, and clarified by centrifugation at 1300 g for 10 minutes at 4°C. For ribosome footprinting, 20 µl RNaseI (Ambion AM2294) was added to the 1.5 ml of supernatant and incubated for 30 minutes at 37°C, then stopped by chilling on ice and addition of 40 µl of SuperaseIn (Ambion AM2694). Footprinted samples were pelleted through a sucrose cushion (1 M sucrose in polysome buffer with added 100 U/ml SuperaseIn) by centrifugation at 260,000 g for 4.5 hours at 4°C, and resuspended in 800 µl 10 mM Tris pH 7.4 with 1% SDS. RNA was purified by hot acid phenol/chloroform extraction and precipitated by standard ethanol precipitation. From this point, ribosome profiling Illumina-compatible sequencing libraries were prepared as previously described (Ingolia et al., 2011). Supplementary material Table S1 lists the primers and subtractive hybridization oligonucleotides corresponding to the most abundant rRNA contaminants that were determined in a pilot ribosome profiling experiment.

### Sequencing and mapping of RPFs

Ribosome profiling libraries were sequenced on an Illumina HiSeq 2000 (one stage per lane, 44 bp reads), resulting in a total of 880 million reads (for an overview, see supplementary material Fig. S1). Following adapter sequence trimming, RPFs were compared with zebrafish rRNAs from the SILVA rRNA database (Quast et al., 2013) using Bowtie2 (Langmead and Salzberg, 2012) (parameters: -N 1; -L 20; -k 20). Reads matching rRNA (~50%) were discarded. The remaining RPFs were mapped by Tophat2 (Trapnell et al., 2009) (parameters: no indels; no novel junctions; -M; -g 10) to a zebrafish developmental transcriptome (Pauli et al., 2012) and the Zv9 genome assembly, resulting in 317 million mapped reads. To obtain near-nucleotide resolution from ribosome profiling (supplementary material Fig. S2), RPFs aligning at annotated start and stop codons of RefSeq genes were subdivided by read length (supplementary material Fig. S2B). Approximate P-site position for each read-length was determined by inspection of coverage and phasing of the read's left-most position relative to annotated start and stop codons. Offsets were determined to be +12 for 27–28 nt RPFs, +13 for 29–31 nt RPFs, and +14 for 32 nt RPFs (supplementary material Fig. S2A). Based on observable phasing over the coding sequences, RPFs between 27 and 32 nts (totaling 220 million) were deemed to be high quality and were used in subsequent analysis. The remaining RPFs were likely to be over- or under-digested, and were discarded. Library sizes between stages were normalized by the number of RPFs in each stage that mapped to annotated coding regions of RefSeq genes. mESC ribosome profiling data was obtained from Ingolia et al. (Ingolia et al., 2011).

### Construction of training and lncRNA data sets

The zebrafish training set was constructed from RefSeq genes in the Zv9/danRer7 zebrafish genome assembly. Only genes expressed at

fragments per kilobase of exon per million fragments mapped (FPKM) >1 (summed over the developmental transcriptome) (Pauli et al., 2012) were used. Similarly, the mouse training set was based on RefSeq genes in the mm9 mouse genome assembly expressed at FPKM >1 in mESCs (Guttmann et al., 2010). ORFs were defined as regions starting with either an ATG or CTG and ending with an in-frame stop codon. Three classes of ORFs were defined: (1) the CDSs in the context of their respective transcripts, (2) all RPF-containing ORFs in transcript leaders in the context of the detached 5' leaders and (3) all RPF-containing ORFs in the transcript trailers in the context of the detached 3' trailers (Fig. 1). CDSs with trailers shorter than 100 nt were not included. Owing to the high number of truncated transcripts annotated in zebrafish, all ORFs in the zebrafish set were required to be at least 20 nts from the transcript edge. ORFs in leaders and trailers were filtered to ensure lack of any overlap with annotated RefSeq, Ensembl or XenoRefSeq coding regions.

For classification, lncRNAs were required to be expressed at >1 FPKM over the developmental time course (for zebrafish) and in ESCs (for mouse). As a few transcripts had a clear RPF-covered coding ORF, but lacked start/stop codons (probably owing to truncations in transcript assembly), ORFs were allowed to extend beyond the ends of transcripts. To account for possible transcript truncations, it was assumed that the start/stop of the ORF was at the edge and a pseudo-trailer of 10 nt was added to all transcripts when calculating IO scores (see below).

### Classification

For each ORF, we used four metrics designed to distinguish between the three classes and capture the features of protein coding genes:

Translational efficiency (TE) is defined as (density of RPFs within ORF)/(RNA expression). Density is the average sum of normalized RPFs over the embryonic time course within the ORF divided by the length of the ORF. RNA expression is the average FPKM of the locus over the embryonic time course containing this transcript.

Inside versus outside (IO) is defined as (coverage inside ORF)/(coverage outside ORF). Coverage refers to the number of nt positions having any RPF divided by the total number of nts inside or outside the ORF. A pseudo-count of 1 is added to both the inside and outside sums.

Fraction length (FL) is defined as (length of ORF)/(length of transcript), i.e. the fraction of the transcript covered by the ORF.

Disengagement score (DS) is defined as (RPFs over ORF)/(RPFs downstream), i.e. the number of RPFs inside the ORF divided by the number of RPFs downstream. A pseudo-count of one was added to both the ORF and downstream sums.

A random forest classifier (Breiman, 2001) (implemented in the R package randomForest) was trained using these four metrics on the respective training sets. The three classes were weighted according to size, and standard options were used (500 trees, two variables per split). Classes were assigned to loci in order to minimize cross-mapping between coding and non-coding isoforms. If any ORF was classified as coding, the locus was considered to be coding. If not, the locus was considered to be leader-like if at least one ORF was classified as leader-like. Finally, if all ORFs were classified as trailer-like or if no ORF had RPFs, the locus was classified as trailer-like.

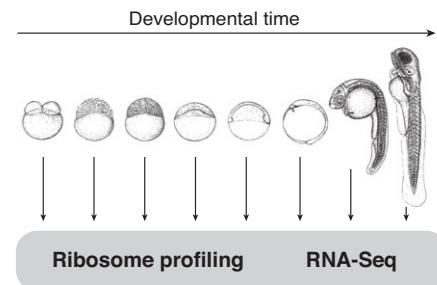
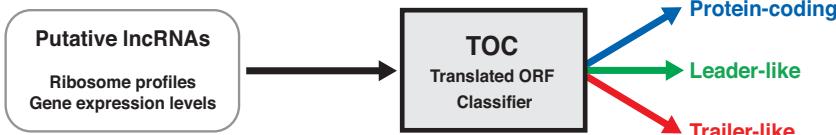
### Public database accession numbers

The ribosome profiling data are accessible at Gene Expression Omnibus (GEO) with accession number GSE46512. The RNA-seq data was published previously (Pauli et al., 2012) and is available at GEO (accession number GSE32900, subseries GSE32898).

## RESULTS AND DISCUSSION

### Ribosome profiling outlines translated regions of zebrafish transcripts

To identify ribosome-associated regions in the zebrafish transcriptome, we generated high-depth ribosome profiles over a time course of eight early developmental stages (Fig. 1; supplementary material Fig. S1; for details see Materials and methods). Of 220 million high-quality RPFs, 84.5 million RPFs

**A DATA ACQUISITION****B TRAINING of CLASSIFIER****C CLASSIFICATION of PUTATIVE IncRNAs**

mapped to RefSeq genes (see Fig. 2A for examples of ribosome profiles). Approximately 81% of RefSeq genes that expressed >1 FPKM (12,228 genes) had at least ten normalized RPFs (supplementary material Fig. S3A), and about 68% of genes had reads over at least 10% of their annotated coding sequence (CDS; supplementary material Fig. S3B). Within exons of RefSeq transcripts, 95.7% of RPFs mapped to CDSs (mean density of 3.64 RPFs per nt), 0.54% of RPFs mapped to 3' transcript trailers (mean density of 0.054 RPFs per nt), and the rest (3.71%) mapped to 5' transcript leaders (mean density of 1.46 RPFs per nt). This distribution corresponds to a >65-fold enrichment of RPFs associated with CDSs compared with 3' trailers, and a >25-fold enrichment of RPFs associated with 5' leaders compared with 3' trailers, consistent with ribosome profiling data in other systems (Brar et al., 2012; Ingolia et al., 2011). As observed in previous studies, we found triplet phasing of ribosome profiles in the CDSs of coding genes, corresponding to the translocation of translating 80S ribosomes in steps of 3 nts (Fig. 2B).

Consistent with the release of 80S ribosomes at in-frame stop codons, RPFs over 3' trailers tend to be sparse and randomly distributed (Fig. 2A), and may represent background experimental noise inherent to the ribosome profiling method. As observed in ribosome profiling data in other systems (Brar et al., 2012; Fritsch et al., 2012; Ingolia et al., 2011; Lee et al., 2012), 5' leaders of coding transcripts are widely associated with ribosomes, showing relatively high densities of RPFs at locations often corresponding, but not limited, to uORFs. The stop codons of annotated ORFs are significantly enriched for RPFs (supplementary material Fig. S2C). We find widespread occurrence of uORFs (49.5% of RefSeq genes have RPF-containing uORFs), as well as many instances of translated, extremely short ORFs that are as small as an AUG followed by a stop (minimal ORFs or minORFs) (supplementary material Fig. S4). These results highlight the power of this approach in identifying translated regions of zebrafish transcripts.

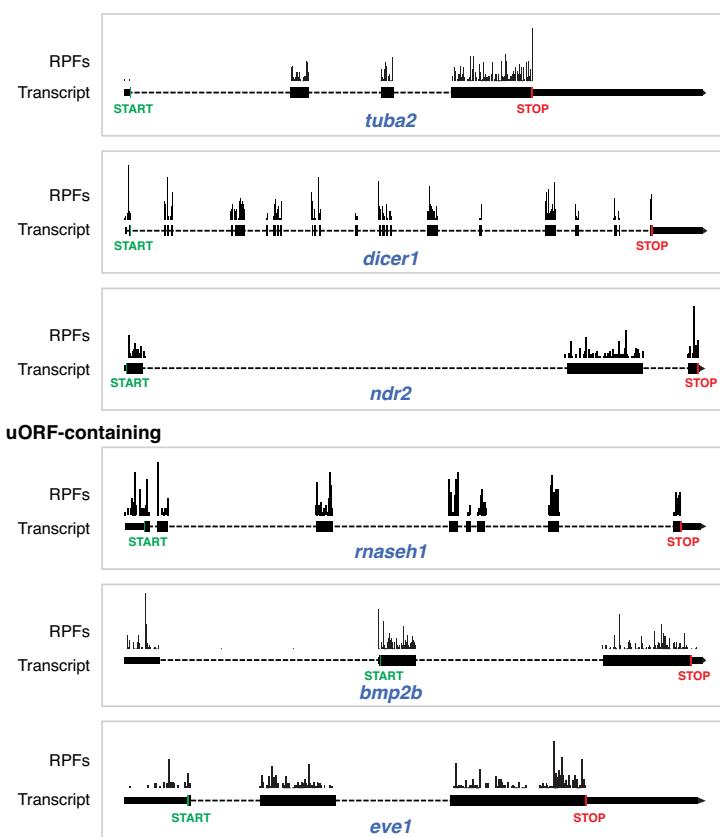
**Fig. 1. Overview of lncRNA classification pipeline.**

**(A,B)** High-throughput sequencing data (ribosome profiling and RNA-seq) from eight developmental stages (A) is used to train a classifier with RefSeq coding sequences (CDSs), 5' leaders and 3' trailers (B). **(C)** The translated ORF classifier (TOC) uses ribosome profiles and gene expression levels to classify putative lncRNAs as protein-coding (blue), leader-like (green) or trailer-like (red).

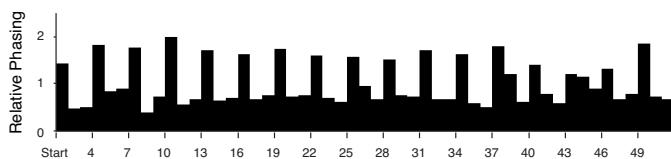
**Translated ORF classifier (TOC) distinguishes ORFs in annotated 5' leaders, CDSs and 3' trailers**

To use the ribosome profiling dataset for the classification of ORFs, we developed a random forest classifier (Breiman, 2001). We tested whether ribosome profiles over RNA subregions might reliably distinguish CDSs from ORFs in 5' leaders and from ORFs in 3' trailers. To train the classifier, we used the RefSeq gene sets in zebrafish and mouse (see Materials and methods for details). Our classifier, called TOC (translated ORF classifier), employs four features (Fig. 3A): (1) Translational efficiency (TE) – the density of ribosome profiling reads over an ORF relative to its expression level; (2) inside versus outside (IO) – the ratio of bases covered within an ORF versus outside (upstream and downstream), capturing a distinct feature of coding transcripts for which read coverage tends to be predominantly over a single ORF; (3) fraction length (FL) – the fraction of the transcript covered by the ORF, accounting for the observation that annotated CDSs tend to span a significant portion of the transcript; and (4) disengagement score (DS) – the degree to which RPFs are absent downstream of the ORF, building on prior knowledge that re-initiation after extended translation and stop-codon read-through are rare events (Jackson et al., 2007). These features effectively integrate intrinsic transcript information, such as sequence and location of ORFs, with external data, such as ribosome profiling and expression levels derived from RNA-seq.

Although individual features were able to separate one class of RefSeq ORFs from the other two, the combination of all four was necessary to distinguish reliably ORFs within annotated 5' leaders, CDSs and 3' trailers (Fig. 3; supplementary material Fig. S5). Notably, TE distinguished 3' trailers from 5' leaders and CDSs, whereas DS helped separate uORFs in 5' leaders from CDSs (Fig. 3B for zebrafish; supplementary material Fig. S5 for mouse). The combination of IO and FL differentiated CDSs from ORFs in 5' leaders and 3' trailers (Fig. 3B; supplementary material Fig. S5).

**A**

**Fig. 2. Ribosome profiles outline translated ORFs of coding genes.** (A) Representative examples of ribosome-protected fragment (RPF) densities associated with protein-coding genes. Gene structures are depicted as thick bars for the coding sequence (CDS), thin bars for 5' leaders and 3' trailers, and dashed lines for introns. Note that the majority of RPFs map within the CDSs and are flanked by the annotated initiation (START, green) and termination codon (STOP, red). The bottom three panels show examples of uORF-containing genes. For these genes, RPF reads map to the CDSs and to short ORFs within the 5' leaders. (B) RefSeq metagene analysis of relative phasing of ribosome P-sites (see Materials and methods). Relative phasing is defined as the number of RPFs at a given position divided by the mean of the number of RPFs at the four adjacent positions. i.e. relative phasing at position  $i = \text{RPFs at position } i / \text{mean (RPFs at positions } i-2, i-1, i+1 \text{ and } i+2\text{)}).$  As in previous studies (Ingolia et al., 2011), triplet phasing of ribosome profiles was observed.

**B**

The use of all four features in the TOC classifier was highly accurate in distinguishing CDSs from 5' leader-like ORFs and 3' trailer-like ORFs even at low RNA expression levels (supplementary material Fig. S6; overall out-of-bag error for zebrafish: 3.25%). These results establish TOC as a powerful classifier to distinguish ORFs in annotated 5' leaders, CDSs and 3' trailers.

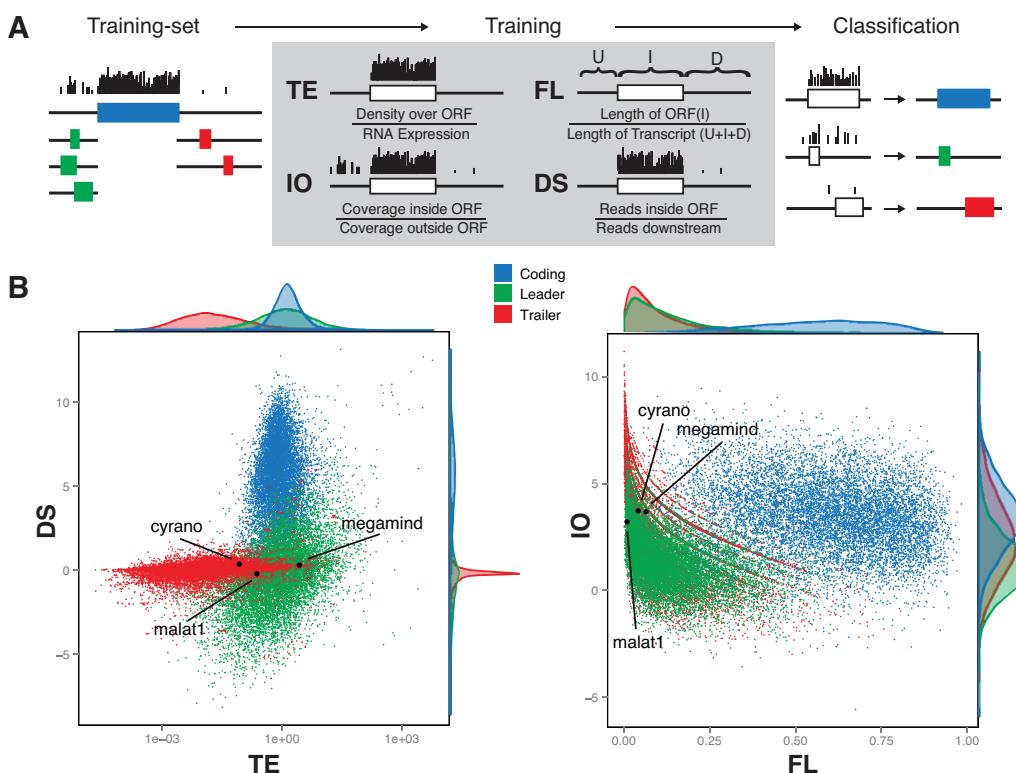
### TOC refines classification of lncRNAs

To refine the classification of putative lncRNAs, we applied TOC to the catalogs recently published for zebrafish embryos (Pauli et al., 2012; Ulitsky et al., 2011) and mESCs (Guttman et al., 2011). The application of TOC to these datasets is justified by the biochemical similarity between coding mRNAs and recently annotated lncRNAs (e.g. both are 5' capped and 3' polyadenylated). Notably, TOC analysis revealed that dozens of putative lncRNAs have the same characteristics as protein-coding mRNAs: a main CDS engaged by ribosomes and few (if any) RPFs downstream (Fig. 4; supplementary material Fig. S7 and Tables S2-S4). Depending on the dataset, we find that 8-45% of previously proposed lncRNAs are likely to be bona fide protein-coding mRNAs (Fig. 4; supplementary material Tables S2-S4). These transcripts will be an interesting resource for identifying previously uncharacterized proteins. By contrast, 18-44% of putative lncRNAs showed little or no association with ribosomes, akin to 3' trailers of

coding transcripts (Fig. 4; supplementary material Tables S2-S4). These transcripts are bona fide lncRNAs and warrant functional characterization.

Strikingly, we found that the ribosome profiles over more than 40% of putative zebrafish and mouse lncRNAs resemble 5' leaders rather than 3' trailers (Fig. 4; supplementary material Tables S2-S4). These lncRNAs contain ORFs with a higher TE than 3' trailer-like lncRNAs, but have shorter and less conserved ORFs than do the CDSs of protein-coding genes (supplementary material Fig. S8). Similar to leaders, RPFs are often distributed over multiple ORFs, none of which stand out as a main CDS of a protein-coding gene. The leader-like class of lncRNAs represents a distinct subset of the previously described short, polycistronic ribosome-associated coding RNAs (sprcRNAs) (Ingolia et al., 2011). Unlike sprcRNAs, which are identified solely by TE, leader-like lncRNAs exclude misannotated protein-coding mRNAs and transcripts with spuriously associated ribosomes.

The association of ribosomes with leader-like lncRNAs raises two important questions: Do the associated ribosomes generate proteins? Are these proteins functional? Several observations suggest that leader-associated ribosomes might generate proteins that are likely to be non-functional. Recent studies have shown that the CHX used in ribosome profiling protocols acts through the E-site of the 60S ribosomal subunit (Schneider-Poetsch et al.,



**Fig. 3. TOC distinguishes ORFs in 5' leaders, CDSs and 3' trailers.** (A) A training set is constructed from RefSeq genes using (1) annotated CDSs (coding ORFs, blue) in the context of the whole transcript, (2) RPF-containing ORFs in the 5' leader sequence (green) in the context of the 5' leader, and (3) RPF-containing ORFs in the 3' trailer (red) in the context of the 3' trailer (see Materials and methods). The four metrics used to train the classifier are displayed in the gray box (TE, translational efficiency; IO, inside versus outside; FL, fragment length; DS, disengagement score). After training, TOC uses RPF-covered ORFs to classify transcripts. (B) The combination of the four metrics separates coding ORFs, leaders and trailers of the training set. Transcripts lacking a protein-coding ORF cluster with trailers and leaders of the training set, as shown for three validated zebrafish lncRNAs (black). The density of each measure is shown along the axes.

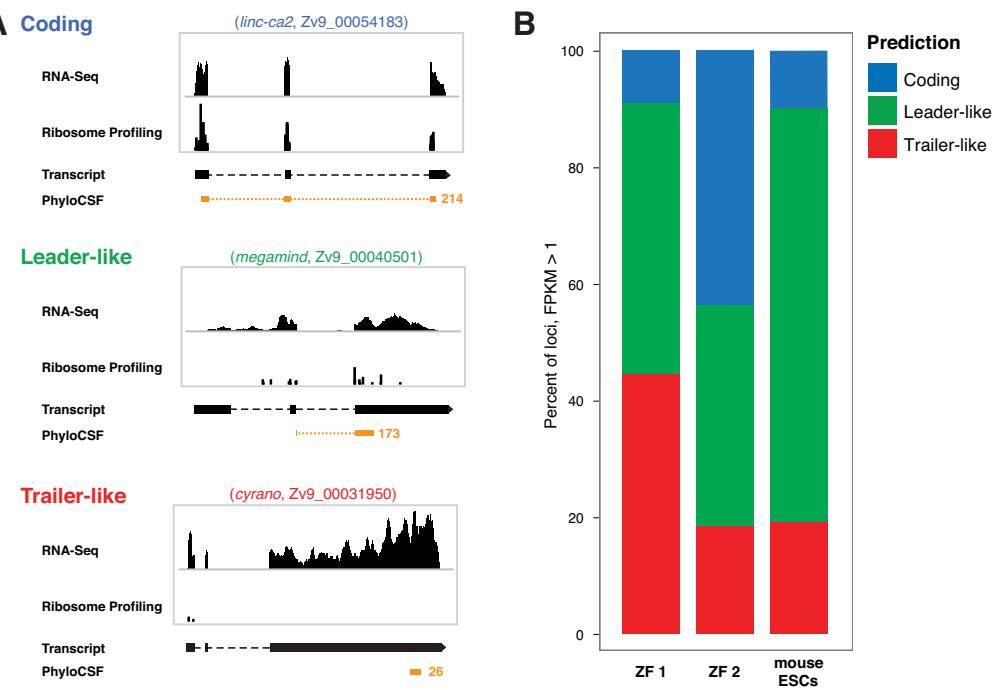
2010), and should only stabilize the translating 80S ribosome during the ribosomal footprinting step. Moreover, the sizes of ribosome footprints isolated in ribosome profiling protocols (~30 nts) correspond to RNA fragments protected by 80S ribosomes (Wolin and Walter, 1988). The translation of ORFs within 5' leaders is further supported by mass spectrometry data (Slavoff et al., 2013) and by observed enrichment of RPFs over sites of translation initiation in ribosome profiling data from harringtonine-treated (Ingolia et al., 2011), lactimidomycin-treated (Lee et al., 2012) and puromycin-treated (Fritsch et al., 2012) samples. Thus, leader-associated ribosome profiles are likely to represent actual translation of ORFs rather than ribosomal subunits scanning the transcript.

The lack of conservation of most uORFs suggests that the protein product might not be functional (Calvo et al., 2009; Hood et al., 2009; Neafsey and Galagan, 2007). Instead, ribosomal engagement with leader-like lncRNAs might be regulatory. Given the regulatory role of uORFs in some coding transcripts (Arribere and Gilbert, 2013; Calvo et al., 2009; Hinnebusch, 2005; Hood et al., 2009; Johansson and Jacobson, 2010), 5' leader-like translation might affect lncRNA stability and/or subcellular localization. Translating ORFs within lncRNAs might target the transcript for nonsense-mediated decay (Tani et al., 2013), degrading it in the cytoplasm and/or retaining it in the nucleus (de Turris et al., 2011), resulting in the predominantly nuclear localization of most lncRNAs (Derrien et al., 2012). Prime candidates for such regulation are the minORF-

containing lncRNAs for which the single amino acid product of their translation could not conceivably be functional. Alternatively, association of ribosomes with leader-like lncRNAs might be translational noise caused by the cytoplasmic location of 5'-capped and polyadenylated transcripts. Such spurious translation may only be functional on evolutionary time scales as the source of novel coding genes (Carvunis et al., 2012).

In summary, our ribosome profiling data and translated ORF classifier allow the high-confidence annotation of coding and non-coding RNAs, complementing and extending previous computational approaches such as PhyloCSF. As demonstrated by our previously published pipeline (Pauli et al., 2012), these more traditional computational approaches can exclude the large majority of potential false-positives but misannotate some conserved lncRNAs as coding RNAs (e.g. *cyrano* and *megamind*) (Ulitsky et al., 2011) (Fig. 4). The use of additional approaches such as mass spectrometry will further improve the annotation of coding and non-coding RNAs in zebrafish (Slavoff et al., 2013).

Although our study has focused on the classification of lncRNAs, the accompanying ribosome profiling data will be a rich resource for the discovery of novel protein-coding genes that act during development. Our dataset increases the depth of previous ribosome profiling datasets in zebrafish by an order of magnitude (Bazzini et al., 2012) and expands the temporal coverage to five days of development. The nucleotide resolution of the data allows annotation of translated subregions of transcripts and the



**Fig. 4. TOC refines classification of lncRNAs.** (A) TOC-based classification improves previous lncRNA predictions. Shown are RNA-seq and ribosome profiling read densities associated with three putative lncRNAs (Ulitsky et al., 2011), which had conflicting annotations in published zebrafish lncRNA sets (Pauli et al., 2012; Ulitsky et al., 2011). Transcript structures are shown in black. Introns are indicated as dashed lines. The region scoring highest in PhyloCSF (Lin et al., 2011) is indicated in orange. Whereas TOC reveals the protein-coding nature of *linc-ca2*, it confirms the non-coding nature of the two conserved lncRNAs *megamind* and *cyrano*. These two lncRNAs had been filtered out in the Pauli et al. lncRNA set owing to their relatively high phylogenetic codon substitution frequency scores (PhyloCSF > 20). (B) Fraction of loci that are classified by TOC as coding (blue), leader-like (green) and trailer-like (red) in three collections of lncRNAs: ZF1 (Pauli et al., 2012), ZF2 (Ulitsky et al., 2011) and mESCs (Guttman et al., 2011).

identification of potential protein isoforms, furthering ongoing efforts to refine zebrafish genome annotation (Kettleborough et al., 2013). Finally, the quantitative nature of ribosome profiling combined with existing RNA-seq data will enable studies of post-transcriptional and translational regulation during zebrafish development.

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#### Competing interests statement

The authors declare no competing financial interests.

#### Author contributions

A.P., A.F.S. and E.V. conceived the study. G.-L.C. adapted and applied ribosome profiling to zebrafish, and analyzed resultant sequencing data, with support from A.P., A.F.S. and E.V. E.V. designed and implemented the classifier, with input from G.-L.C. and A.P., and discussions with J.L.R., A.R. and A.F.S. G.-L.C., A.P., E.V. and A.F.S. wrote the manuscript, with contributions from J.L.R. and A.R.

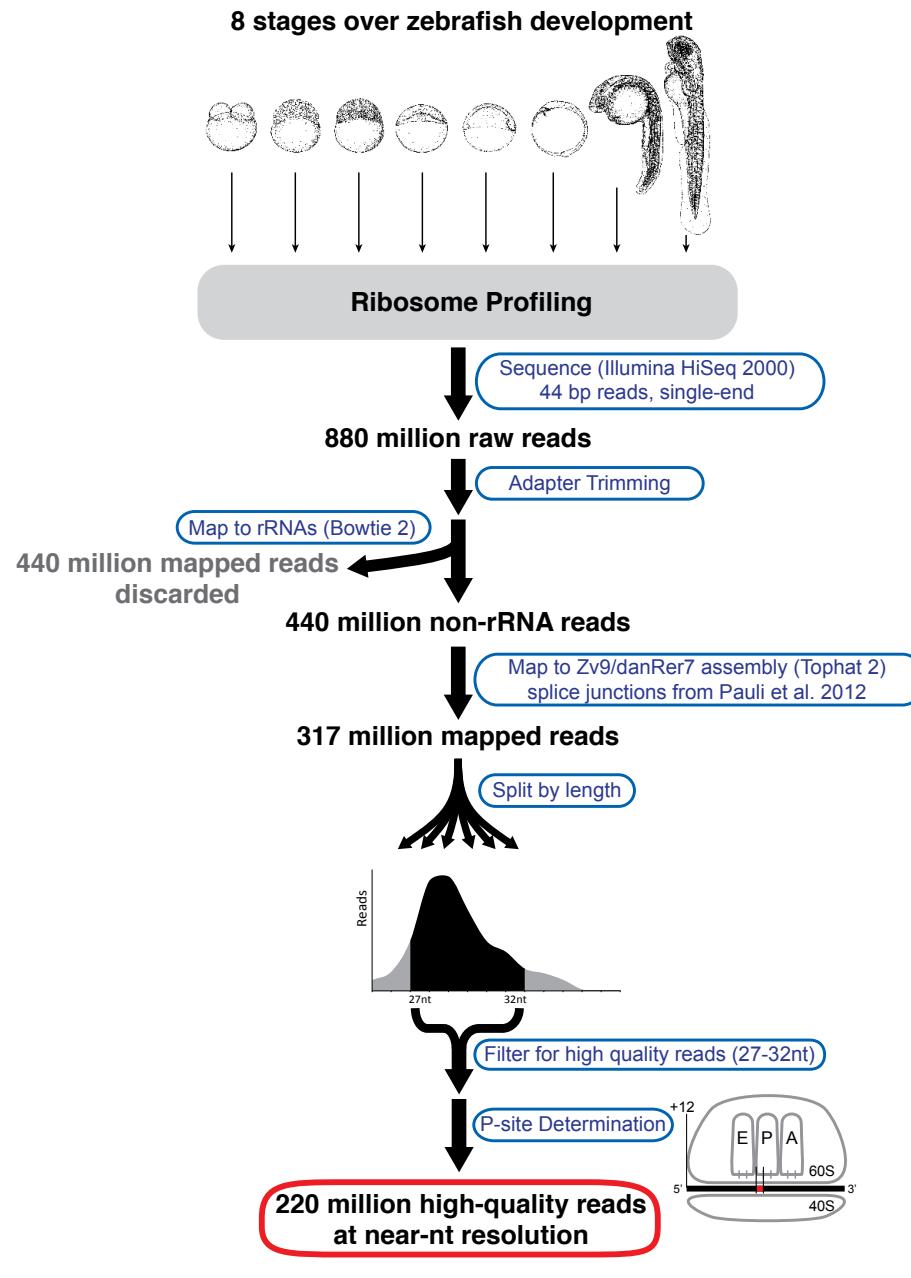
#### Supplementary material

Supplementary material available online at <http://dev.biologists.org/lookup/suppl/doi:10.1242/dev.098343/-DC1>

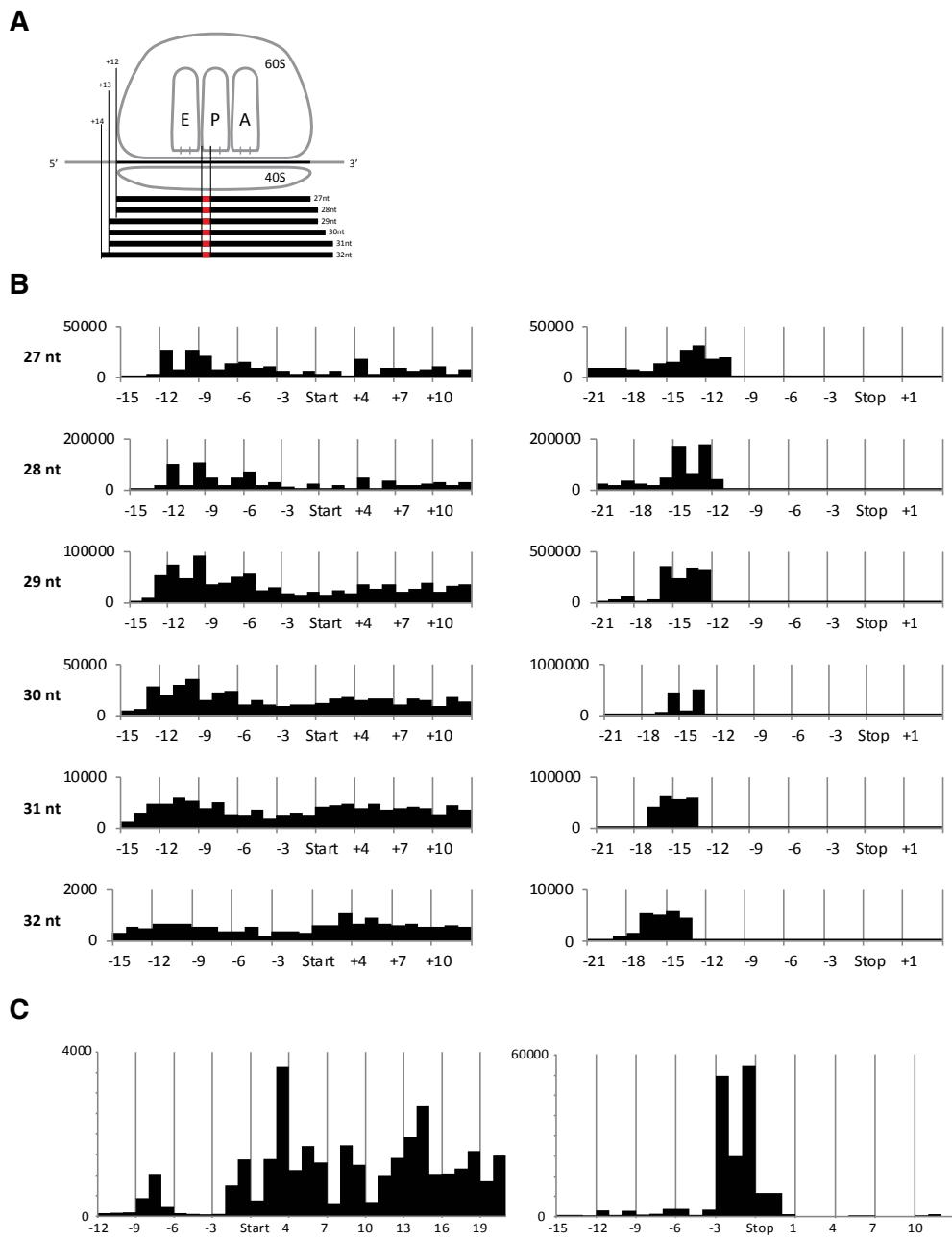
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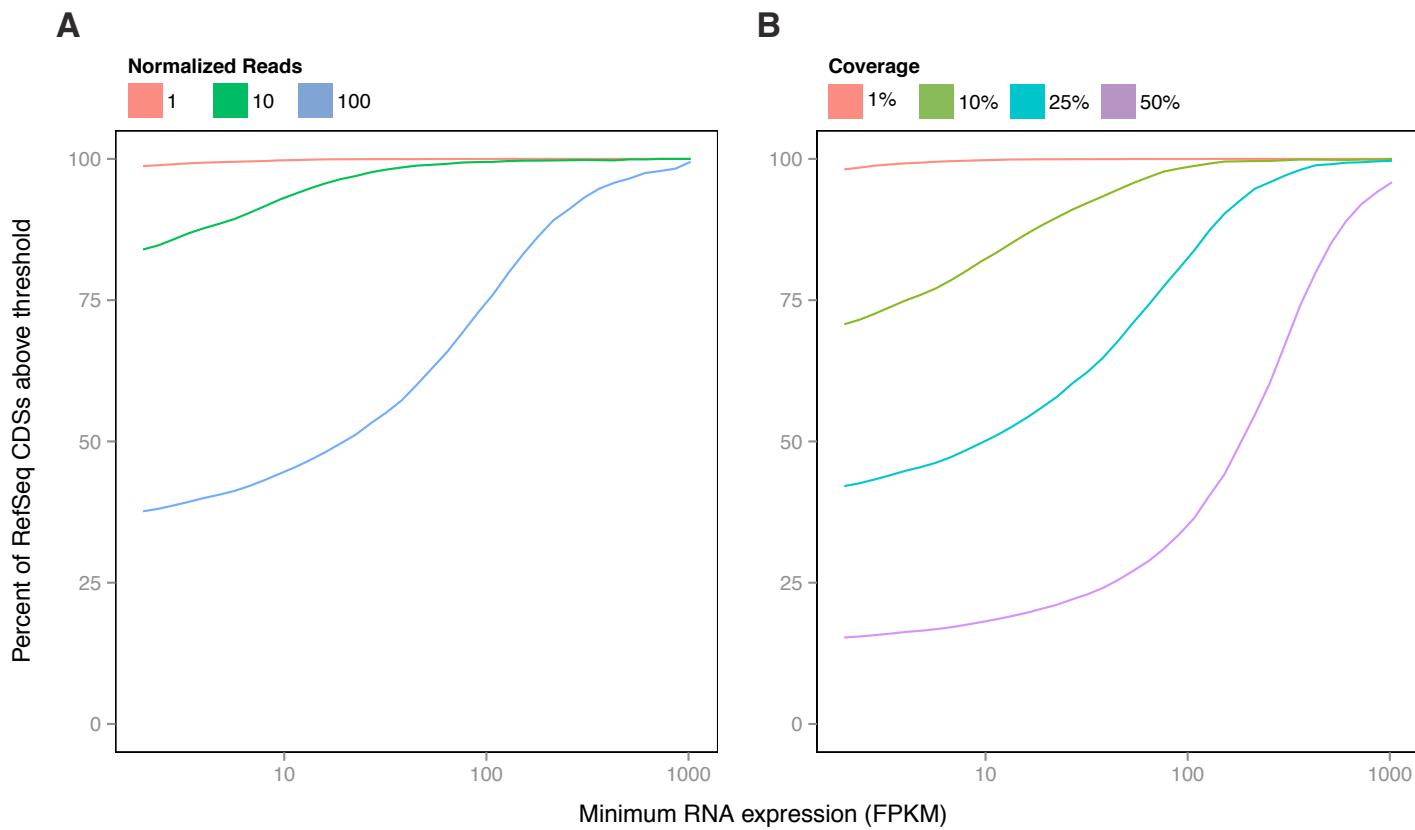
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**Fig. S1. Schematic for sequencing and mapping of ribosome protected fragments.** For details, see Materials and methods in main text.



**Fig. S2. Determination of P-site positions of mapped reads from ribosome profiling.** Single-nucleotide mapping of RPF reads. **(A)** Schematic for the offset from the leftmost position of reads of various lengths. Position of red nucleotide corresponds to the first position of the P-site in the 80s ribosome. **(B)** Leftmost position of RPF reads as a function of read length. Leftmost positions of the mapped RPFs are stratified over the start (left) and stop (right) codons of a RefSeq metagene. **(C)** P-site position of mapped reads following offset correction, stratified over the start (left) and stop (right) codon of a RefSeq metagene. A strong peak is observed at the codon position just prior to the stop codon.



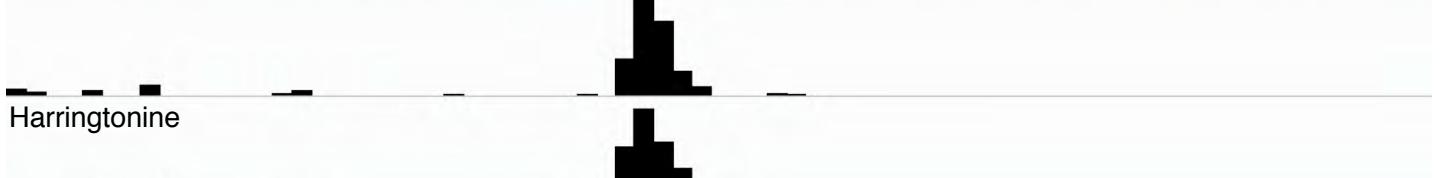
**Fig. S3. Ribosome profiling statistics of expressed RefSeq genes.** **(A)** Sum of RPF reads associated with the CDSs of expressed RefSeq genes relative to minimum transcript expression levels. The plot shows the fraction of RefSeq CDSs (y axis) associated with at least 1, 10 or 100 summed normalized RPFs. **(B)** RPF-coverage of the CDSs of expressed RefSeq genes relative to minimum transcript expression levels. The plot shows the fraction of RefSeq genes (y axis) having at least 1, 10, 25 or 50% (color scale) of all nucleotides within their coding regions covered by one or more RPFs. RPFs are evaluated at single nucleotide level, and a single RPF can therefore only cover one nucleotide. For example, 68.19% of RefSeq genes expressed at >1 FPKM have 10% of their nucleotides covered by at least one RPF. Note that the fraction of genes above the thresholds [normalized sum (A) or coverage (B)] increase with increasing RNA expression levels (FPKM).

**A**

No treatment

**B**

Cycloheximide

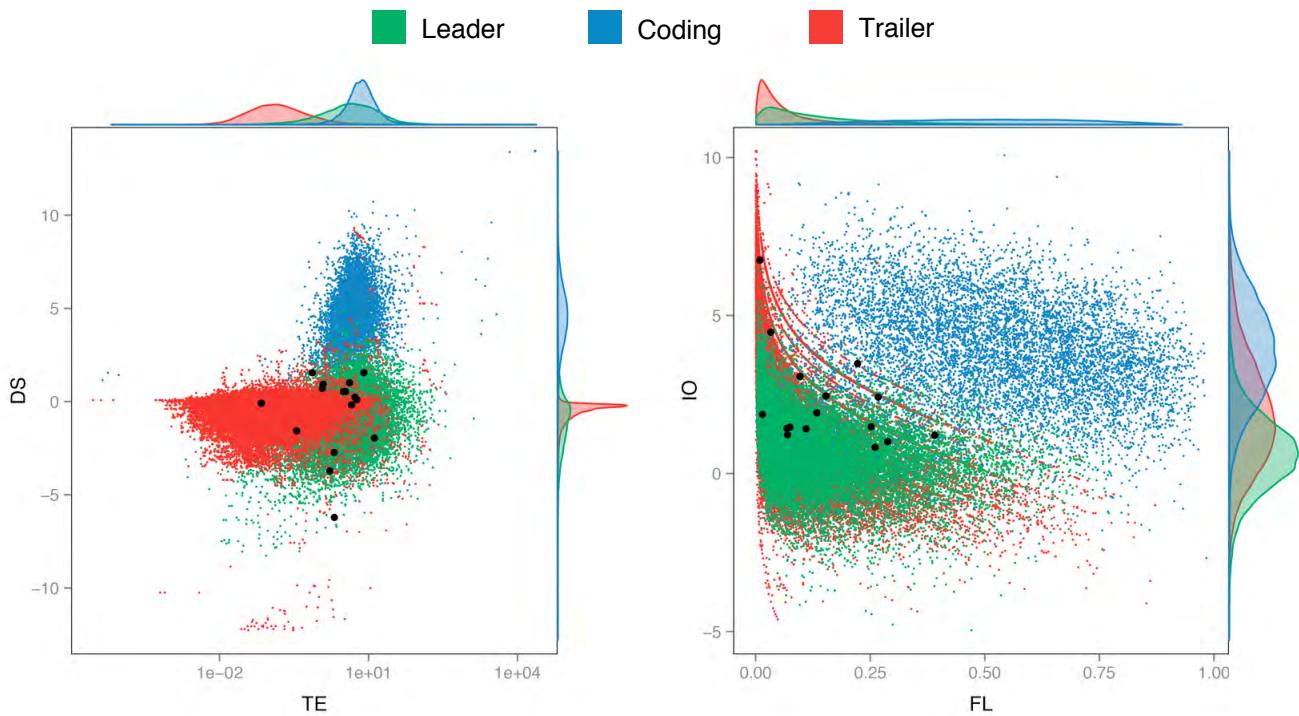


Harringtonine

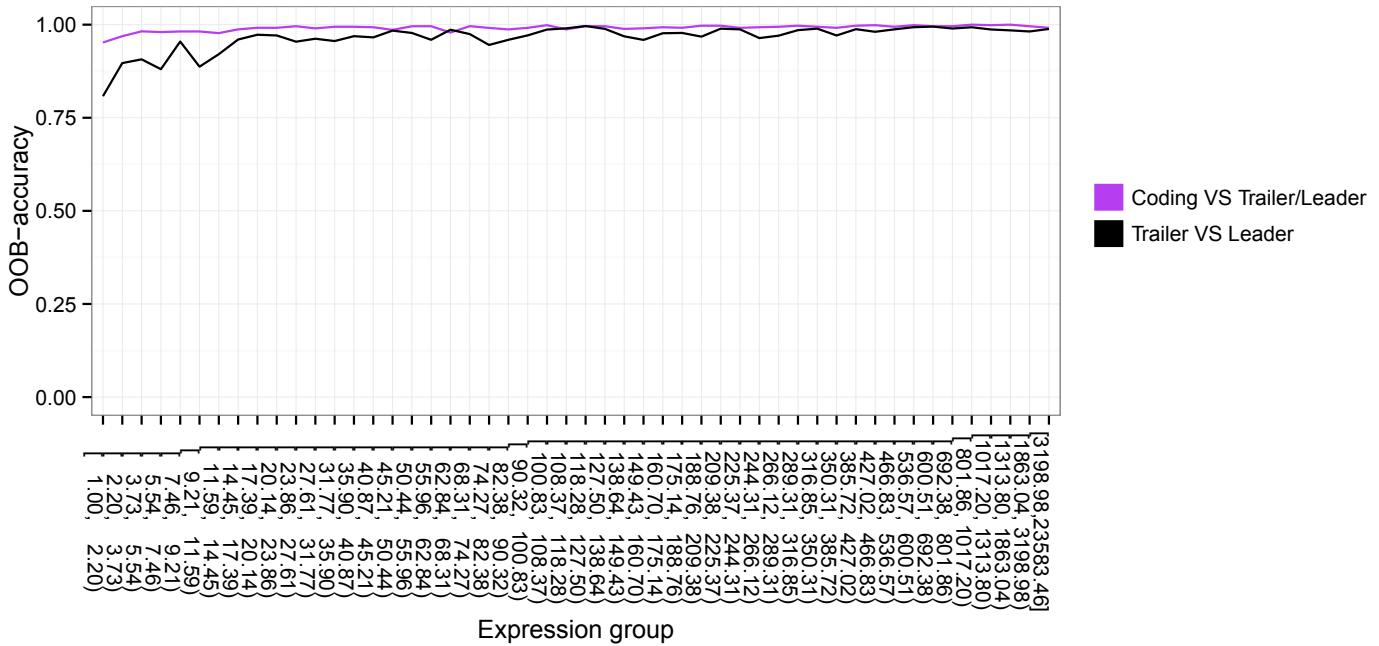


Mouse Jarid2 leader

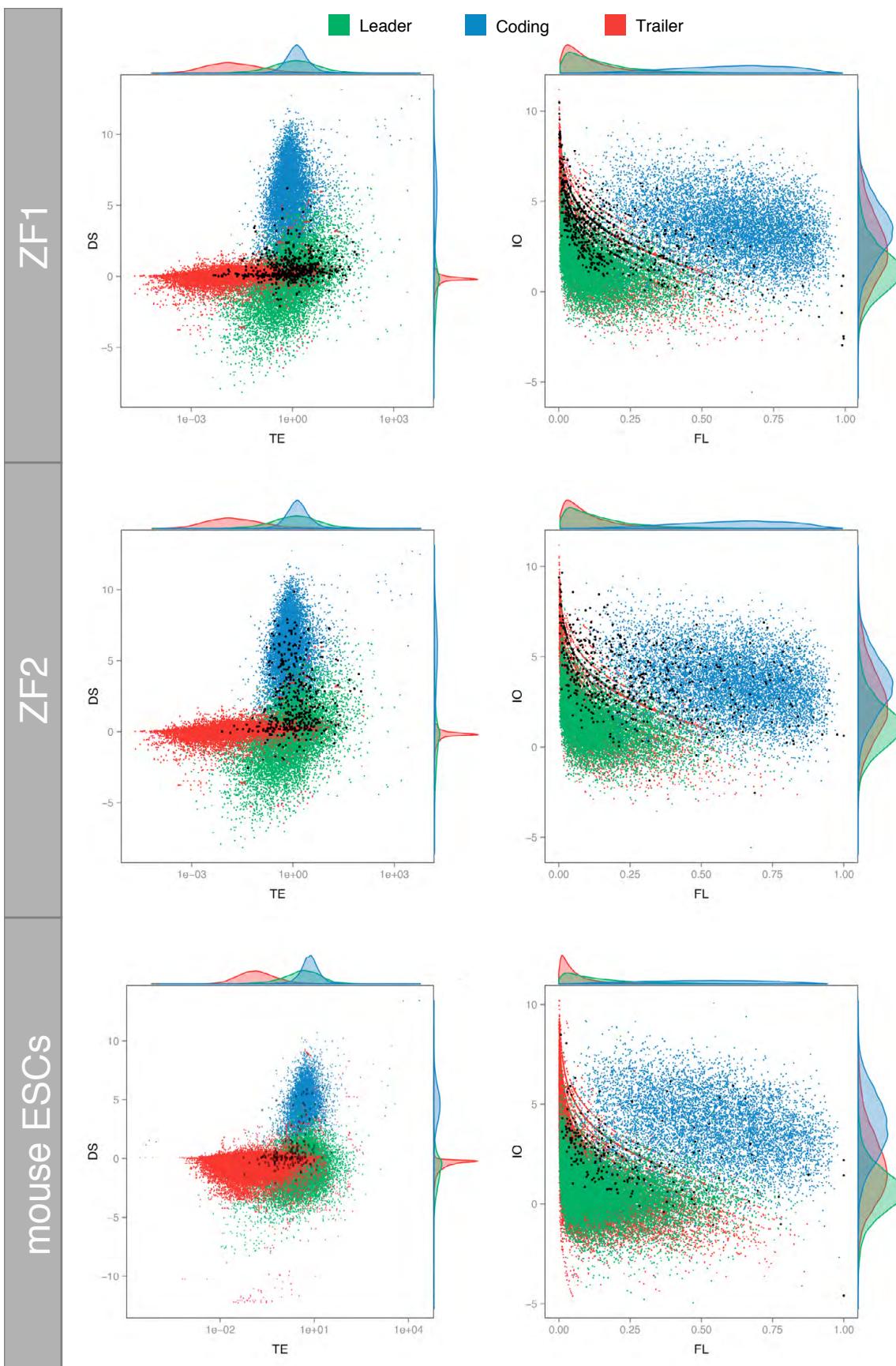
**Fig. S4. Examples of minORFs in the leader sequence of *Jarid2* in zebrafish and mouse.** (A,B) minORFs in zebrafish (A) and mouse (B) were identified as distinct peaks of RPF enrichment over Start-Stop sequences in 5' leaders. For the majority of minORFs, initiation at an upstream alternative Start codon is unlikely owing to the absence of upstream in frame initiation codons. Additional support for the existence of minORFs comes from ribosome profiling experiments in mouse ESCs in the presence of harringtonine (Ingolia et al., 2011). Although our RPF data does not show a distinctive enrichment of RPF reads at initiation codons (no drug pre-treatment), harringtonine leads to an accumulation of ribosomes over the initiating codon (Ingolia et al., 2011). RPF densities of harringtonine-treated mESCs resemble those of cycloheximide-treated mESCs (B), suggesting that initiation does indeed occur at the AUG immediately preceding the STOP codon. Asterisks in red boxes indicate the STOP codon.



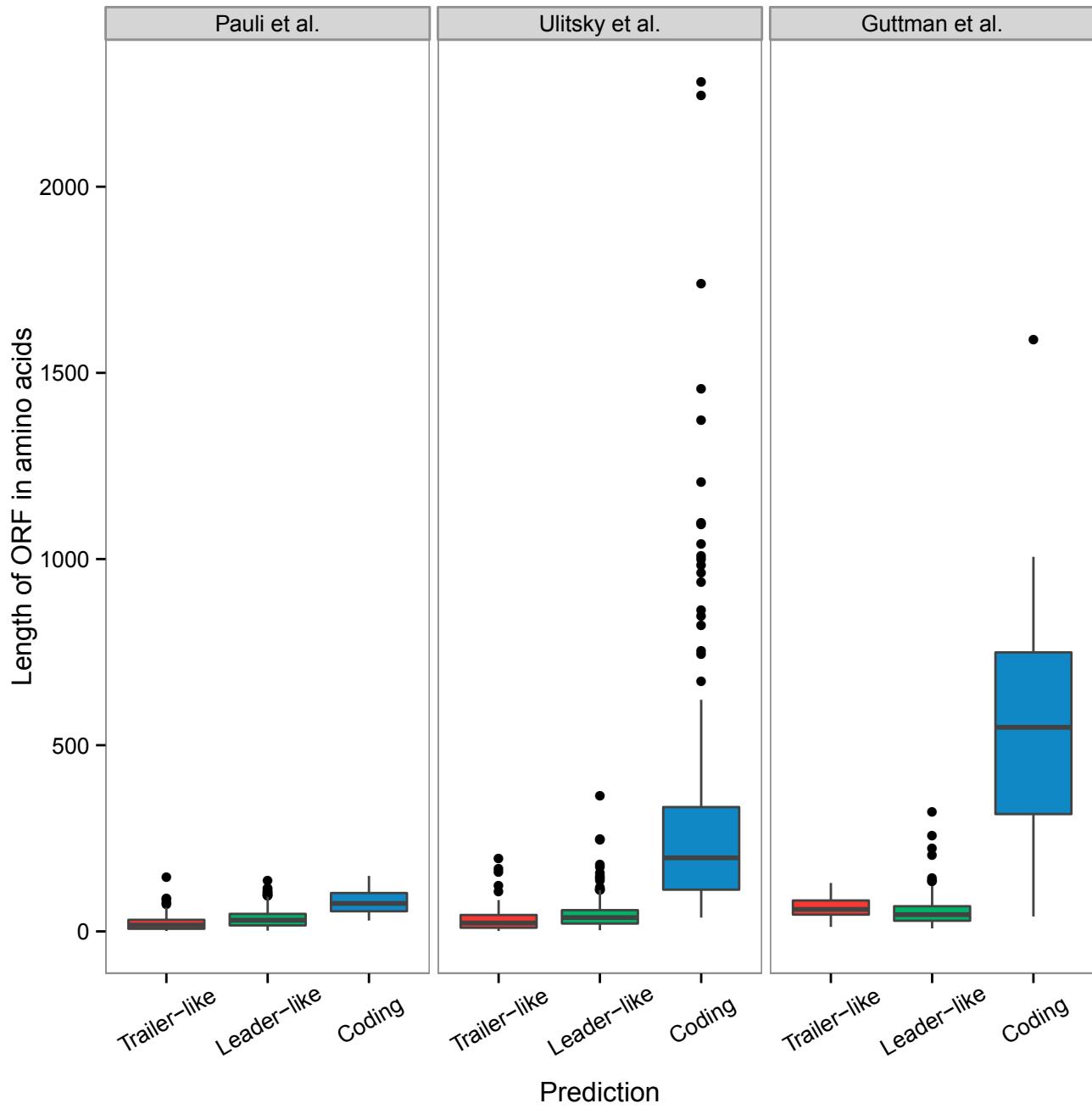
**Fig. S5. TOC distinguishes ORFs in 5' leaders, CDSs and 3' trailers of mouse genes.** A training set was constructed from mouse RefSeq genes using (1) annotated CDSs (coding ORFs) in the context of the whole transcript, (2) RPF-containing ORFs in 5' leader sequences in the context of the 5' leaders, and (3) RPF-containing ORFs in 3' trailers in the context of the 3' trailers. Training was performed as described for zebrafish (see main text and Fig. 3A), using the metrics translational efficiency (TE), inside versus outside (IO), fragment length (FL) and disengagement score (DS). The combination of the four metrics separates coding ORFs (blue), leaders (green) and trailers (red) of the training set. The density of each measure is shown along the axes. ORFs of well-annotated lncRNAs (black) are plotted on top of ORFs of the RefSeq training set and cluster with trailers and leaders. The ORF with the most bases covered by RPFs was used to represent each lncRNA. Shown are 18 mouse lncRNAs: *Adapt33*, *Gas5*, *H19*, *Malat1*, *Meg3*, *Neat1*, *Rian*, *SNHG1*, *SNHG3*, *SNHG4*, *SNHG5*, *SNHG6*, *SNHG7*, *SNHG8*, *SNHG10*, *SNHG12*, *Tsix* and *Tug1*.



**Fig. S6. Accuracy of TOC as a function of expression.** Accuracy of TOC as a function of expression when classifying CDSs versus ORFs within trailers and leaders (purple), and when classifying ORFs within trailers versus ORFs within leaders (black). Accuracy was calculated as the fraction of correct predictions divided by all out-of-bag (OOB) predictions at a given expression level.



**Fig. S7. TOC-based classification of lncRNAs in zebrafish and mouse.** TOC was used to classify ORFs in previously proposed zebrafish and mouse lncRNA sets [ZF1: (Pauli et al., 2012); ZF2: (Ulitsky et al., 2011); mouse ESCs: (Guttman et al., 2011)]. ORFs of lncRNAs (black) are plotted on top of ORFs of the respective zebrafish or mouse RefSeq training sets (blue: CDS; green: ORFs of 5' leaders; red: ORFs of 3' trailers). The ORF with the most bases covered by RPFs was used to represent each lncRNA. lncRNAs without any RPFs are not shown in this figure. See Fig. 3 for explanation of the four metrics.v



**Fig. S8. Length of ORFs subdivided by TOC-based classification across three sets of lncRNAs.** Coding ORFs are significantly longer than trailer-like and leader-like ORFs. The boxes denote the first, second (median) and third quartiles. The whiskers denote  $1.5 \times$  inter-quartile range.

**Table S1. Oligonucleotide sequences**

<b>5'-adenylated, 3' dideoxy-C Linker-1 for linker-ligation</b>	
/5rApp/CTGTAGGCACCATCAAT/3ddC/	
<b>5' biotinylated DNA oligos (RNase-free PAGE purified) for rRNA depletion</b>	
100 µM in 10 mM Tris pH 7.4 in the following proportions:	
23.29 µl	/5Biosg/GGCGACCCTCAGACAGGCGTGGCCCCGGGAT
30.29 µl	/5Biosg/GCGGCCCTCCGTACGCCACAGGTCCCTC
14.33 µl	/5Biosg/TCTGATAAAATGCACGCGTCCCCGGGT
14.33 µl	/5Biosg/CCCCGCCTCACCGGGTAAGTGAGGAAACGA
3.20 µl	/5Biosg/TGGTTTCCCGCAACGCTGCCGGGGTCAT
5.35 µl	/5Biosg/AATCAGGTCTACGAGTCATT
4.09 µl	/5Biosg/TCCTAGCTGGGTATTCAATGGGGCGC
2.84 µl	/5Biosg/TCCCGGTTACCCGGGGCCTATCGGAGATCCG
0.57 µl	/5Biosg/CCCCCACCCCCCGCACGGCCCCGGGGCGCTT
1.71 µl	/5Biosg/AGCCTCCATCAGAAGGACTTTGGCCCCCCC
in 100 µl of sub-hyb mix. 1 µl of mix used in 30 µl total volume of subtractive hybridization reaction	
<b>5'-phosphorylated (for ssDNA circularization), internal spacer adapter primer with internal spacer:</b>	
/5Phos/GATCGGAAGAGCGTCGTGTAGGGAAAGAGTGTA/iSp18/CACTCA/iSp18/GTGACTGGAGTTCAGACGTGTGCTCTCCGATCTATTGATGGTGCCTACAG	
<b>Final library PCR forward and reverse primers:</b>	
Forward: AATGATA CGGCG ACCACCGAGATCTACACTCTTCCCTACACGAC	
Reverse: CAAGCAGAACGGCATACGAGATGTGACTGGAGTTCAGACGTGTGCTCTCCGATC	

**Table S2. TOC predictions for lncRNAs from Pauli et al.** TOC was used to classify proposed zebrafish lncRNAs from Pauli et al. (Pauli et al., 2012). Listed are the name of the locus (XLOC\_xxx), the transcript identifier and the RNA-seq based expression level in fragments per kilobase of exon per million fragments mapped (FPKM). For the most coding-like ORF (for predicted coding transcripts) or leader-like ORF (for predicted leader-like or trailer-like transcripts) within a transcript, the list shows the relative frequency of trees that classify that ORF as trailer, leader or coding. Note that this ORF may not necessarily be the longest or the most RPF-dense ORF within the locus. The last column contains the resulting TOC-based classification for the particular transcript. Transcript structures with all associated metadata (chromosome start/end, strand, locus name, isoform name, exon-intron structure) are accessible as GTF files at Gene Expression Omnibus (GEO) (accession number GSE46512).

	Locus	Transcript	FPKM	Trailer	Leader	Coding	Prediction
1	XLOC_014679	Zv9_00018845	1.007536	0.984	0.016	0	0Trailer-like
2	XLOC_013998	Zv9_00016369	1.015053	1	0	0	0Trailer-like
3	XLOC_010628	Zv9_00056252	1.029703	1	0	0	0Trailer-like
4	XLOC_012087	Zv9_00009587	1.0353688	1	0	0	0Trailer-like
5	XLOC_004030	Zv9_00035237	1.0533204	0.906	0.094	0	0Trailer-like
6	XLOC_007108	Zv9_00003780	1.0595292	1	0	0	0Trailer-like
7	XLOC_000239	Zv9_00057831	1.0626	1	0	0	0Trailer-like
8	XLOC_011695	Zv9_00008186	1.0681745	1	0	0	0Trailer-like
9	XLOC_000736	Zv9_00001697	1.0763945	1	0	0	0Trailer-like
10	XLOC_004823	Zv9_00038131	1.11711396	0.956	0.044	0	0Trailer-like
11	XLOC_015684	Zv9_00022274	1.13672	1	0	0	0Trailer-like
12	XLOC_006009	Zv9_00042745	1.140429	1	0	0	0Trailer-like
13	XLOC_001416	Zv9_00025472	1.1427214	1	0	0	0Trailer-like
14	XLOC_014799	Zv9_00019319	1.1500853	1	0	0	0Trailer-like
15	XLOC_015527	Zv9_00021638	1.1548035	1	0	0	0Trailer-like
16	XLOC_000836	Zv9_00002091	1.165835	1	0	0	0Trailer-like
17	XLOC_013594	Zv9_00014890	1.1662876	1	0	0	0Trailer-like
18	XLOC_005489	Zv9_00040838	1.1775514	1	0	0	0Trailer-like
19	XLOC_014410	Zv9_00017979	1.177612	1	0	0	0Trailer-like
20	XLOC_010498	Zv9_00055741	1.193375	1	0	0	0Trailer-like
21	XLOC_005336	Zv9_00040241	1.1981899	0.678	0.322	0	0Trailer-like
22	XLOC_004837	Zv9_00038185	1.2104329	1	0	0	0Trailer-like
23	XLOC_000140	Zv9_00057549	1.211435	1	0	0	0Trailer-like
24	XLOC_007075	Zv9_00003599	1.2236698	1	0	0	0Trailer-like
25	XLOC_004820	Zv9_00038123	1.2305882	0.674	0.326	0	0Trailer-like
26	XLOC_009650	Zv9_00052272	1.2321205	1	0	0	0Trailer-like
27	XLOC_005217	Zv9_00039682	1.238463	1	0	0	0Trailer-like
28	XLOC_004972	Zv9_00038706	1.24575123	0.554	0.446	0	0Trailer-like
29	XLOC_009606	Zv9_00052160	1.2472086	0.784	0.176	0.04	0.04Trailer-like
30	XLOC_012326	Zv9_00010501	1.24817	1	0	0	0Trailer-like
31	XLOC_012735	Zv9_00011802	1.2561448	1	0	0	0Trailer-like
32	XLOC_012037	Zv9_00009390	1.2585519	1	0	0	0Trailer-like
33	XLOC_000797	Zv9_00001944	1.26677	1	0	0	0Trailer-like
34	XLOC_002640	Zv9_00030333	1.2744843	0.918	0.082	0	0Trailer-like
35	XLOC_015994	Zv9_00023370	1.28552175	0.85	0.15	0	0Trailer-like
36	XLOC_007909	Zv9_00046312	1.292573	1	0	0	0Trailer-like
37	XLOC_015843	Zv9_00022866	1.2934247	1	0	0	0Trailer-like

38	XLOC_011738	Zv9_00008324	1.3132349	1	0	0Trailer-like
39	XLOC_009531	Zv9_00051915	1.3206916	0.746	0.254	0Trailer-like
40	XLOC_010435	Zv9_00055439	1.3285343	0.676	0.324	0Trailer-like
41	XLOC_008974	Zv9_00049966	1.3411061	1	0	0Trailer-like
42	XLOC_007170	Zv9_00004027	1.34262226	0.528	0.472	0Trailer-like
43	XLOC_006727	Zv9_00045002	1.348948	1	0	0Trailer-like
44	XLOC_002022	Zv9_00027768	1.35229	1	0	0Trailer-like
45	XLOC_003956	Zv9_00034940	1.354561	1	0	0Trailer-like
46	XLOC_004175	Zv9_00035749	1.359154	0.62	0.38	0Trailer-like
47	XLOC_011717	Zv9_00008265	1.3604523	0.748	0.252	0Trailer-like
48	XLOC_006711	Zv9_00044934	1.3645604	1	0	0Trailer-like
49	XLOC_011805	Zv9_00008556	1.373329	1	0	0Trailer-like
50	XLOC_015117	Zv9_00020233	1.4118045	1	0	0Trailer-like
51	XLOC_010716	Zv9_00056652	1.4398844	1	0	0Trailer-like
52	XLOC_015367	Zv9_00021157	1.4415364	1	0	0Trailer-like
53	XLOC_000026	Zv9_00058275	1.4511349	0.532	0.358	0.11Trailer-like
54	XLOC_012296	Zv9_00010387	1.48856501	0.752	0.234	0.014Trailer-like
55	XLOC_007064	Zv9_00003550	1.4998208	0.774	0.226	0Trailer-like
56	XLOC_002219	Zv9_00028592	1.5079514	0.978	0.022	0Trailer-like
57	XLOC_015669	Zv9_00022227	1.5214832	0.536	0.464	0Trailer-like
58	XLOC_014772	Zv9_00019203	1.5272688	1	0	0Trailer-like
59	XLOC_013118	Zv9_00013210	1.5344495	1	0	0Trailer-like
60	XLOC_005185	Zv9_00039585	1.5449469	0.596	0.402	0.002Trailer-like
61	XLOC_004308	Zv9_00036173	1.553124	1	0	0Trailer-like
62	XLOC_013794	Zv9_00015673	1.56184159	0.548	0.358	0.094Trailer-like
63	XLOC_011940	Zv9_00008796	1.59537904	1	0	0Trailer-like
64	XLOC_001023	Zv9_00024017	1.597621	0.968	0.032	0Trailer-like
65	XLOC_001772	Zv9_00026769	1.60616177	1	0	0Trailer-like
66	XLOC_001622	Zv9_00026216	1.609382	1	0	0Trailer-like
67	XLOC_002837	Zv9_00030999	1.6172855	1	0	0Trailer-like
68	XLOC_014209	Zv9_00017193	1.6517659	0.968	0.032	0Trailer-like
69	XLOC_009712	Zv9_00052538	1.6738462	0.82	0.18	0Trailer-like
70	XLOC_015158	Zv9_00020419	1.6742653	1	0	0Trailer-like
71	XLOC_007928	Zv9_00046393	1.6868635	1	0	0Trailer-like
72	XLOC_009653	Zv9_00052276	1.6869573	0.892	0.108	0Trailer-like
73	XLOC_002113	Zv9_00028216	1.70068171	1	0	0Trailer-like
74	XLOC_014101	Zv9_00016768	1.740575	1	0	0Trailer-like
75	XLOC_004037	Zv9_00035274	1.7669895	1	0	0Trailer-like
76	XLOC_011844	Zv9_00008640	1.7901682	1	0	0Trailer-like
77	XLOC_002623	Zv9_00030263	1.791754	0.7	0.3	0Trailer-like
78	XLOC_010359	Zv9_00055121	1.8025996	0.774	0.226	0Trailer-like
79	XLOC_000323	Zv9_00000198	1.84177461	0.756	0.228	0.016Trailer-like
80	XLOC_012245	Zv9_00010057	1.8453813	0.862	0.138	0Trailer-like
81	XLOC_008133	Zv9_00046997	1.8745471	1	0	0Trailer-like
82	XLOC_012273	Zv9_00010272	1.89615158	1	0	0Trailer-like
83	XLOC_013102	Zv9_00013149	1.92401123	0.808	0.178	0.014Trailer-like
84	XLOC_011612	Zv9_00007852	1.9414082	1	0	0Trailer-like
85	XLOC_014776	Zv9_00019217	1.95246842	1	0	0Trailer-like
86	XLOC_003442	Zv9_00033173	1.953506	1	0	0Trailer-like
87	XLOC_003818	Zv9_00034511	1.9557562	1	0	0Trailer-like
88	XLOC_008946	Zv9_00049871	1.9693442	1	0	0Trailer-like
89	XLOC_001717	Zv9_00026528	1.9713826	1	0	0Trailer-like
90	XLOC_002409	Zv9_00029450	2.000364	0.94	0.06	0Trailer-like
91	XLOC_004276	Zv9_00036047	2.04382126	0.958	0.042	0Trailer-like
92	XLOC_008923	Zv9_00049790	2.05251	1	0	0Trailer-like

93	XLOC_002559	Zv9_00029985	2.06899	1	0	0Trailer-like
94	XLOC_009582	Zv9_00052099	2.0734445	0.564	0.436	0Trailer-like
95	XLOC_010181	Zv9_00054442	2.1035511	1	0	0Trailer-like
96	XLOC_002407	Zv9_00029445	2.1199078	1	0	0Trailer-like
97	XLOC_009770	Zv9_00052769	2.13654367	1	0	0Trailer-like
98	XLOC_015901	Zv9_00023067	2.1961622	0.708	0.29	0.002Trailer-like
99	XLOC_012289	Zv9_00010362	2.2127285	1	0	0Trailer-like
100	XLOC_012846	Zv9_00012300	2.22318328	1	0	0Trailer-like
101	XLOC_009989	Zv9_00053593	2.250111	1	0	0Trailer-like
102	XLOC_001864	Zv9_00027123	2.2590134	1	0	0Trailer-like
103	XLOC_007917	Zv9_00046349	2.2657439	0.842	0.132	0.026Trailer-like
104	XLOC_011792	Zv9_00008517	2.2739188	0.64	0.358	0.002Trailer-like
105	XLOC_003366	Zv9_00032941	2.2851039	0.498	0.488	0.014Trailer-like
106	XLOC_005899	Zv9_00042432	2.302946	0.862	0.136	0.002Trailer-like
107	XLOC_006994	Zv9_00003315	2.341606	0.562	0.438	0Trailer-like
108	XLOC_001365	Zv9_00025266	2.3429614	1	0	0Trailer-like
109	XLOC_002575	Zv9_00030066	2.34487088	0.878	0.122	0Trailer-like
110	XLOC_012312	Zv9_00010460	2.34902	1	0	0Trailer-like
111	XLOC_011158	Zv9_00006213	2.34985	1	0	0Trailer-like
112	XLOC_012791	Zv9_00012059	2.35141027	1	0	0Trailer-like
113	XLOC_007661	Zv9_00045551	2.374607	1	0	0Trailer-like
114	XLOC_002497	Zv9_00029721	2.3970064	1	0	0Trailer-like
115	XLOC_008264	Zv9_00047425	2.465567	1	0	0Trailer-like
116	XLOC_010081	Zv9_00053986	2.4691132	0.572	0.42	0.008Trailer-like
117	XLOC_012264	Zv9_00010180	2.558463	1	0	0Trailer-like
118	XLOC_004867	Zv9_00038276	2.5877743	1	0	0Trailer-like
119	XLOC_007655	Zv9_00045542	2.5960522	0.524	0.476	0Trailer-like
120	XLOC_015536	Zv9_00021695	2.62818696	0.968	0.032	0Trailer-like
121	XLOC_015538	Zv9_00021709	2.6342902	1	0	0Trailer-like
122	XLOC_010197	Zv9_00054513	2.639227	0.642	0.358	0Trailer-like
123	XLOC_000014	Zv9_00058418	2.693553	0.644	0.356	0Trailer-like
124	XLOC_014771	Zv9_00019201	2.706089	1	0	0Trailer-like
125	XLOC_014250	Zv9_00017338	2.7206458	1	0	0Trailer-like
126	XLOC_014259	Zv9_00017368	2.7229457	1	0	0Trailer-like
127	XLOC_000050	Zv9_00058518	2.730212	0.594	0.406	0Trailer-like
128	XLOC_012242	Zv9_00010036	2.73922365	0.996	0.004	0Trailer-like
129	XLOC_010911	Zv9_00005311	2.821442	1	0	0Trailer-like
130	XLOC_008881	Zv9_00049571	2.8561211	1	0	0Trailer-like
131	XLOC_015361	Zv9_00021150	2.932951	1	0	0Trailer-like
132	XLOC_007870	Zv9_00046174	2.97775833	0.97	0.03	0Trailer-like
133	XLOC_007373	Zv9_00004656	2.9988947	0.942	0.058	0Trailer-like
134	XLOC_005797	Zv9_00042018	3.0691106	1	0	0Trailer-like
135	XLOC_015103	Zv9_00020187	3.12002201	0.874	0.124	0.002Trailer-like
136	XLOC_009451	Zv9_00051620	3.13524477	1	0	0Trailer-like
137	XLOC_007082	Zv9_00003645	3.148196	0.824	0.176	0Trailer-like
138	XLOC_007512	Zv9_00005180	3.157358	0.812	0.188	0Trailer-like
139	XLOC_003391	Zv9_00033021	3.1603877	0.938	0.062	0Trailer-like
140	XLOC_013976	Zv9_00016342	3.189407	1	0	0Trailer-like
141	XLOC_013751	Zv9_00015488	3.2346992	1	0	0Trailer-like
142	XLOC_014777	Zv9_00019219	3.24823297	1	0	0Trailer-like
143	XLOC_014756	Zv9_00019140	3.2818944	0.812	0.188	0Trailer-like
144	XLOC_012806	Zv9_00012116	3.380097	1	0	0Trailer-like
145	XLOC_006993	Zv9_00003314	3.43742039	0.65	0.35	0Trailer-like
146	XLOC_011998	Zv9_00009213	3.457186	1	0	0Trailer-like
147	XLOC_001472	Zv9_00025648	3.653908	1	0	0Trailer-like

148	XLOC_006062	Zv9_00042938	3.659168	1	0	0Trailer-like
149	XLOC_003436	Zv9_00033168	3.695989	1	0	0Trailer-like
150	XLOC_013284	Zv9_00013748	3.697597	1	0	0Trailer-like
151	XLOC_013169	Zv9_00013344	3.732943	0.916	0.084	0Trailer-like
152	XLOC_014684	Zv9_00018867	3.7332481	1	0	0Trailer-like
153	XLOC_004038	Zv9_00035276	3.747982	1	0	0Trailer-like
154	XLOC_011171	Zv9_00006267	3.7643594	1	0	0Trailer-like
155	XLOC_013684	Zv9_00015227	3.82495607	1	0	0Trailer-like
156	XLOC_005512	Zv9_00040930	3.83917	1	0	0Trailer-like
157	XLOC_014850	Zv9_00019492	3.8693372	0.828	0.172	0Trailer-like
158	XLOC_010418	Zv9_00055360	3.9415159	1	0	0Trailer-like
159	XLOC_010664	Zv9_00056404	3.9692418	0.954	0.046	0Trailer-like
160	XLOC_003912	Zv9_00034771	4.0027732	0.772	0.228	0Trailer-like
161	XLOC_015423	Zv9_00021301	4.008935	1	0	0Trailer-like
162	XLOC_011475	Zv9_00007410	4.0094885	1	0	0Trailer-like
163	XLOC_013084	Zv9_00013076	4.037135	1	0	0Trailer-like
164	XLOC_001133	Zv9_00024401	4.0878622	0.882	0.118	0Trailer-like
165	XLOC_012324	Zv9_00010492	4.102043	1	0	0Trailer-like
166	XLOC_009782	Zv9_00052809	4.1552094	0.888	0.11	0.002Trailer-like
167	XLOC_001799	Zv9_00026890	4.4102014	0.824	0.1	0.076Trailer-like
168	XLOC_002890	Zv9_00031197	4.449279	1	0	0Trailer-like
169	XLOC_004373	Zv9_00036501	4.5808644	1	0	0Trailer-like
170	XLOC_013585	Zv9_00014860	4.724115	0.874	0.114	0.012Trailer-like
171	XLOC_002627	Zv9_00030283	4.7903063	0.996	0.004	0Trailer-like
172	XLOC_002753	Zv9_00030750	4.8000877	0.988	0.012	0Trailer-like
173	XLOC_011407	Zv9_00007165	5.0049623	1	0	0Trailer-like
174	XLOC_015776	Zv9_00022596	5.24286601	1	0	0Trailer-like
175	XLOC_003453	Zv9_00033223	5.246651	0.954	0.046	0Trailer-like
176	XLOC_003542	Zv9_00033512	5.46952416	0.686	0.314	0Trailer-like
177	XLOC_004593	Zv9_00037307	5.5434412	0.772	0.228	0Trailer-like
178	XLOC_005175	Zv9_00039541	5.746612	1	0	0Trailer-like
179	XLOC_012722	Zv9_00011730	5.769935	0.522	0.46	0.018Trailer-like
180	XLOC_010115	Zv9_00054098	5.884813	1	0	0Trailer-like
181	XLOC_011053	Zv9_00005827	5.9075263	1	0	0Trailer-like
182	XLOC_001356	Zv9_00025199	6.1219911	0.578	0.388	0.034Trailer-like
183	XLOC_007764	Zv9_00045867	6.195856	0.9	0.1	0Trailer-like
184	XLOC_012244	Zv9_00010056	6.201548	1	0	0Trailer-like
185	XLOC_012588	Zv9_00011317	6.206141	1	0	0Trailer-like
186	XLOC_000238	Zv9_00058248	6.409572	0.962	0.038	0Trailer-like
187	XLOC_009382	Zv9_00051260	6.45301	0.75	0.206	0.044Trailer-like
188	XLOC_012472	Zv9_00010983	6.5478745	0.964	0.036	0Trailer-like
189	XLOC_004742	Zv9_00037833	6.586833	1	0	0Trailer-like
190	XLOC_011952	Zv9_00008901	7.09024	1	0	0Trailer-like
191	XLOC_012274	Zv9_00010277	7.0963364	0.898	0.102	0Trailer-like
192	XLOC_012451	Zv9_00010912	7.42036	1	0	0Trailer-like
193	XLOC_004843	Zv9_00038203	7.6028841	0.942	0.058	0Trailer-like
194	XLOC_007747	Zv9_00045827	7.91723	1	0	0Trailer-like
195	XLOC_015315	Zv9_00021018	7.9516494	1	0	0Trailer-like
196	XLOC_014384	Zv9_00017882	8.032252	0.58	0.412	0.008Trailer-like
197	XLOC_004029	Zv9_00035225	8.544242	1	0	0Trailer-like
198	XLOC_016110	Zv9_00023747	8.6720594	1	0	0Trailer-like
199	XLOC_014528	Zv9_00018303	9.1369851	0.892	0.108	0Trailer-like
200	XLOC_003846	Zv9_00034594	9.2826982	0.81	0.19	0Trailer-like
201	XLOC_012260	Zv9_00010124	9.4377401	0.85	0.13	0.02Trailer-like
202	XLOC_007442	Zv9_00004900	9.616672	0.782	0.196	0.022Trailer-like

203	XLOC_008536	Zv9_00048327	9.6598277	1	0	0Trailer-like
204	XLOC_008332	Zv9_00047750	9.770221	0.964	0.032	0.004Trailer-like
205	XLOC_012474	Zv9_00010988	10.156961	0.732	0.238	0.03Trailer-like
206	XLOC_008891	Zv9_00049609	10.1606577	1	0	0Trailer-like
207	XLOC_008878	Zv9_00049563	10.2236269	1	0	0Trailer-like
208	XLOC_001566	Zv9_00025990	10.246189	1	0	0Trailer-like
209	XLOC_001761	Zv9_00026715	10.8615654	0.92	0.08	0Trailer-like
210	XLOC_003743	Zv9_00034191	10.956571	1	0	0Trailer-like
211	XLOC_004315	Zv9_00036211	11.05256	0.656	0.152	0.192Trailer-like
212	XLOC_003778	Zv9_00034315	11.188248	1	0	0Trailer-like
213	XLOC_009935	Zv9_00053361	11.485778	1	0	0Trailer-like
214	XLOC_004522	Zv9_00037065	13.0916098	0.636	0.364	0Trailer-like
215	XLOC_013338	Zv9_00013995	13.46096	1	0	0Trailer-like
216	XLOC_001437	Zv9_00025545	13.636503	1	0	0Trailer-like
217	XLOC_014738	Zv9_00019078	14.2944211	1	0	0Trailer-like
218	XLOC_011951	Zv9_00008864	14.332881	1	0	0Trailer-like
219	XLOC_001842	Zv9_00027058	15.714357	1	0	0Trailer-like
220	XLOC_011231	Zv9_00006444	16.414416	0.888	0.108	0.004Trailer-like
221	XLOC_003301	Zv9_00032709	16.5687	1	0	0Trailer-like
222	XLOC_001053	Zv9_00024127	16.9262964	1	0	0Trailer-like
223	XLOC_003748	Zv9_00034198	17.7100052	1	0	0Trailer-like
224	XLOC_014737	Zv9_00019077	17.96532	0.994	0.006	0Trailer-like
225	XLOC_012290	Zv9_00010363	18.31792532	1	0	0Trailer-like
226	XLOC_009204	Zv9_00050673	20.11012	1	0	0Trailer-like
227	XLOC_012197	Zv9_00009870	20.19149	0.86	0.14	0Trailer-like
228	XLOC_014270	Zv9_00017393	20.2331161	0.592	0.408	0Trailer-like
229	XLOC_003813	Zv9_00034478	20.842376	1	0	0Trailer-like
230	XLOC_012129	Zv9_00009710	21.163132	0.994	0.006	0Trailer-like
231	XLOC_001801	Zv9_00026898	21.778514	1	0	0Trailer-like
232	XLOC_003682	Zv9_00033972	23.312479	1	0	0Trailer-like
233	XLOC_004050	Zv9_00035331	25.394844	1	0	0Trailer-like
234	XLOC_013753	Zv9_00015491	27.765557	1	0	0Trailer-like
235	XLOC_009688	Zv9_00052425	27.787386	1	0	0Trailer-like
236	XLOC_007369	Zv9_00004647	27.822115	1	0	0Trailer-like
237	XLOC_001653	Zv9_00026333	28.671688	1	0	0Trailer-like
238	XLOC_001094	Zv9_00024272	29.48762	1	0	0Trailer-like
239	XLOC_011650	Zv9_00007990	29.5100322	1	0	0Trailer-like
240	XLOC_006107	Zv9_00043135	31.979294	1	0	0Trailer-like
241	XLOC_004705	Zv9_00037691	32.783192	0.972	0.008	0.02Trailer-like
242	XLOC_003753	Zv9_00034218	33.15648	1	0	0Trailer-like
243	XLOC_001321	Zv9_00025064	35.03069697	1	0	0Trailer-like
244	XLOC_012308	Zv9_00010436	38.8006062	1	0	0Trailer-like
245	XLOC_005167	Zv9_00039513	39.2286	1	0	0Trailer-like
246	XLOC_011970	Zv9_00009078	40.0801941	0.998	0.002	0Trailer-like
247	XLOC_000064	Zv9_00058043	41.29443	0.856	0.114	0.03Trailer-like
248	XLOC_012734	Zv9_00011799	42.166888	1	0	0Trailer-like
249	XLOC_009705	Zv9_00052508	42.63646	0.99	0.01	0Trailer-like
250	XLOC_004366	Zv9_00036459	45.4008598	0.406	0.294	0.3Trailer-like
251	XLOC_013686	Zv9_00015229	58.30274	1	0	0Trailer-like
252	XLOC_015157	Zv9_00020417	60.237864	1	0	0Trailer-like
253	XLOC_011285	Zv9_00006671	61.99122	1	0	0Trailer-like
254	XLOC_011310	Zv9_00006785	68.6309	0.996	0.004	0Trailer-like
255	XLOC_006423	Zv9_00044103	74.40678	1	0	0Trailer-like
256	XLOC_015546	Zv9_00021734	75.31762	1	0	0Trailer-like
257	XLOC_010379	Zv9_00055192	87.836249	1	0	0Trailer-like

258	XLOC_000030	Zv9_00057945	117.975864	1	0	0Trailer-like
259	XLOC_011957	Zv9_00008961	125.308656	1	0	0Trailer-like
260	XLOC_005088	Zv9_00039234	139.5556	0.484	0.396	0.12Trailer-like
261	XLOC_012254	Zv9_00010108	161.14748	0.992	0.008	0Trailer-like
262	XLOC_006045	Zv9_00042863	163.6178	0.894	0.102	0.004Trailer-like
263	XLOC_015787	Zv9_00022624	164.42657	0.666	0.15	0.184Trailer-like
264	XLOC_011955	Zv9_00008933	167.938586	0.996	0.004	0Trailer-like
265	XLOC_014378	Zv9_00017842	184.1334251	1	0	0Trailer-like
266	XLOC_007772	Zv9_00045895	197.501462	0.996	0.002	0.002Trailer-like
267	XLOC_013349	Zv9_00014063	321.1174	0.836	0.122	0.042Trailer-like
268	XLOC_015146	Zv9_00020371	355.892082	1	0	0Trailer-like
269	XLOC_010625	Zv9_00056238	395.442629	0.532	0.252	0.216Trailer-like
270	XLOC_001541	Zv9_00025887	411.017	0.828	0.168	0.004Trailer-like
271	XLOC_003456	Zv9_00033229	584.4842	0.63	0.332	0.038Trailer-like
272	XLOC_000901	Zv9_00002264	1.027113	0.024	0.962	0.014Leader-like
273	XLOC_015074	Zv9_00020119	1.0349569	0.122	0.878	0Leader-like
274	XLOC_000661	Zv9_00001432	1.03579388	0.082	0.918	0Leader-like
275	XLOC_003838	Zv9_00034573	1.0600469	0	1	0Leader-like
276	XLOC_014302	Zv9_00017522	1.0626247	0.164	0.712	0.124Leader-like
277	XLOC_001172	Zv9_00024544	1.068847	0.068	0.888	0.044Leader-like
278	XLOC_009235	Zv9_00050814	1.07728	0.006	0.846	0.148Leader-like
279	XLOC_007361	Zv9_00004625	1.0789515	0.052	0.946	0.002Leader-like
280	XLOC_009843	Zv9_00053049	1.0814414	0.016	0.984	0Leader-like
281	XLOC_016017	Zv9_00023435	1.0871805	0.252	0.748	0Leader-like
282	XLOC_007290	Zv9_00004390	1.092802	0.004	0.996	0Leader-like
283	XLOC_002777	Zv9_00030804	1.0945214	0.016	0.984	0Leader-like
284	XLOC_009918	Zv9_00053299	1.09567148	0	1	0Leader-like
285	XLOC_006799	Zv9_00002727	1.09946946	0.006	0.994	0Leader-like
286	XLOC_012634	Zv9_00011448	1.1034851	0.128	0.852	0.02Leader-like
287	XLOC_002779	Zv9_00030806	1.1186238	0.004	0.996	0Leader-like
288	XLOC_013997	Zv9_00016353	1.123561	0.01	0.99	0Leader-like
289	XLOC_012258	Zv9_00010117	1.13227794	0	1	0Leader-like
290	XLOC_006924	Zv9_00003128	1.133565	0.012	0.988	0Leader-like
291	XLOC_013198	Zv9_00013454	1.1410331	0.008	0.992	0Leader-like
292	XLOC_002074	Zv9_00027978	1.1514663	0	1	0Leader-like
293	XLOC_014949	Zv9_00019805	1.15788722	0.048	0.948	0.004Leader-like
294	XLOC_002081	Zv9_00028057	1.1804958	0.124	0.876	0Leader-like
295	XLOC_010186	Zv9_00054464	1.1830062	0.012	0.964	0.024Leader-like
296	XLOC_007673	Zv9_00045584	1.20184442	0.008	0.992	0Leader-like
297	XLOC_006695	Zv9_00044898	1.2089249	0	1	0Leader-like
298	XLOC_004016	Zv9_00035154	1.2907086	0.108	0.862	0.03Leader-like
299	XLOC_006899	Zv9_00003043	1.2970366	0.034	0.966	0Leader-like
300	XLOC_004875	Zv9_00038310	1.3168204	0.174	0.816	0.01Leader-like
301	XLOC_002323	Zv9_00029074	1.3294631	0.356	0.644	0Leader-like
302	XLOC_014274	Zv9_00017400	1.332423	0.058	0.93	0.012Leader-like
303	XLOC_013409	Zv9_00014280	1.3358359	0.314	0.686	0Leader-like
304	XLOC_001961	Zv9_00027517	1.3453034	0	1	0Leader-like
305	XLOC_006555	Zv9_00044522	1.3461064	0.036	0.964	0Leader-like
306	XLOC_003376	Zv9_00032975	1.3536725	0.188	0.812	0Leader-like
307	XLOC_011741	Zv9_00008330	1.3601835	0.026	0.974	0Leader-like
308	XLOC_000069	Zv9_00058048	1.373027	0.062	0.91	0.028Leader-like
309	XLOC_012678	Zv9_00011602	1.384471	0.108	0.89	0.002Leader-like
310	XLOC_004010	Zv9_00035133	1.3925373	0.114	0.846	0.04Leader-like
311	XLOC_011042	Zv9_00005794	1.404295	0.076	0.924	0Leader-like
312	XLOC_010447	Zv9_00055494	1.4383322	0.08	0.804	0.116Leader-like

313	XLOC_011215	Zv9_00006400	1.45430093	0.484	0.516	0Leader-like
314	XLOC_001223	Zv9_00024672	1.4563405	0.006	0.988	0.006Leader-like
315	XLOC_009590	Zv9_00052124	1.4613863	0.038	0.892	0.07Leader-like
316	XLOC_003714	Zv9_00034071	1.4628609	0.006	0.994	0Leader-like
317	XLOC_002083	Zv9_00028066	1.46385	0.1	0.884	0.016Leader-like
318	XLOC_010776	Zv9_00056846	1.4727263	0.142	0.704	0.154Leader-like
319	XLOC_006952	Zv9_00003201	1.4811542	0.072	0.928	0Leader-like
320	XLOC_015349	Zv9_00021128	1.4854559	0.32	0.674	0.006Leader-like
321	XLOC_003680	Zv9_00033951	1.501263	0.17	0.826	0.004Leader-like
322	XLOC_002290	Zv9_00028888	1.5085055	0.004	0.994	0.002Leader-like
323	XLOC_012743	Zv9_00011860	1.52172406	0.128	0.87	0.002Leader-like
324	XLOC_009655	Zv9_00052279	1.5303937	0.128	0.872	0Leader-like
325	XLOC_012309	Zv9_00010446	1.549212	0.012	0.988	0Leader-like
326	XLOC_006228	Zv9_00043473	1.568795	0.442	0.536	0.022Leader-like
327	XLOC_008633	Zv9_00048716	1.5853332	0.07	0.93	0Leader-like
328	XLOC_008139	Zv9_00047019	1.588199	0.004	0.97	0.026Leader-like
329	XLOC_000873	Zv9_00002190	1.6076713	0	1	0Leader-like
330	XLOC_002444	Zv9_00029555	1.6214696	0.01	0.976	0.014Leader-like
331	XLOC_015697	Zv9_00022318	1.6287848	0.002	0.998	0Leader-like
332	XLOC_001650	Zv9_00026319	1.6550099	0.226	0.774	0Leader-like
333	XLOC_014750	Zv9_00019124	1.6738063	0.074	0.866	0.06Leader-like
334	XLOC_016013	Zv9_00023424	1.73571853	0.018	0.982	0Leader-like
335	XLOC_014586	Zv9_00018476	1.7362301	0.002	0.996	0.002Leader-like
336	XLOC_012251	Zv9_00010088	1.7770662	0.034	0.966	0Leader-like
337	XLOC_008404	Zv9_00047975	1.7776441	0.12	0.874	0.006Leader-like
338	XLOC_012960	Zv9_00012634	1.7931326	0.006	0.994	0Leader-like
339	XLOC_005279	Zv9_00039987	1.80840847	0.142	0.856	0.002Leader-like
340	XLOC_013672	Zv9_00015175	1.838817	0.008	0.992	0Leader-like
341	XLOC_014048	Zv9_00016589	1.8789291	0.022	0.978	0Leader-like
342	XLOC_014681	Zv9_00018847	1.9486021	0.342	0.594	0.064Leader-like
343	XLOC_015833	Zv9_00022842	1.96951442	0.074	0.926	0Leader-like
344	XLOC_003186	Zv9_00032233	1.9778307	0.054	0.944	0.002Leader-like
345	XLOC_000025	Zv9_00058431	1.9788001	0.006	0.994	0Leader-like
346	XLOC_014212	Zv9_00017208	1.9865992	0.12	0.842	0.038Leader-like
347	XLOC_003064	Zv9_00031824	2.03858	0.03	0.956	0.014Leader-like
348	XLOC_002195	Zv9_00028496	2.04994	0.012	0.988	0Leader-like
349	XLOC_008348	Zv9_00047819	2.0692602	0.012	0.988	0Leader-like
350	XLOC_005282	Zv9_00039992	2.083931	0.322	0.67	0.008Leader-like
351	XLOC_005423	Zv9_00040568	2.0862162	0	0.998	0.002Leader-like
352	XLOC_003416	Zv9_00033103	2.1415162	0.25	0.75	0Leader-like
353	XLOC_001646	Zv9_00026302	2.15432264	0.008	0.992	0Leader-like
354	XLOC_009676	Zv9_00052377	2.1923748	0.298	0.678	0.024Leader-like
355	XLOC_014680	Zv9_00018846	2.2333126	0.048	0.938	0.014Leader-like
356	XLOC_008940	Zv9_00049826	2.2697741	0.042	0.948	0.01Leader-like
357	XLOC_008736	Zv9_00049020	2.27834409	0.23	0.77	0Leader-like
358	XLOC_001715	Zv9_00026526	2.296984	0.198	0.788	0.014Leader-like
359	XLOC_011309	Zv9_00006769	2.3089852	0.008	0.932	0.06Leader-like
360	XLOC_008489	Zv9_00048216	2.312168	0	0.974	0.026Leader-like
361	XLOC_005996	Zv9_00042707	2.31964356	0.084	0.916	0Leader-like
362	XLOC_015019	Zv9_00020005	2.3353059	0.032	0.486	0.482Leader-like
363	XLOC_007049	Zv9_00003483	2.360727	0.044	0.956	0Leader-like
364	XLOC_014220	Zv9_00017232	2.37677557	0.036	0.962	0.002Leader-like
365	XLOC_013372	Zv9_00014136	2.396578	0.036	0.964	0Leader-like
366	XLOC_014514	Zv9_00018260	2.3973466	0.05	0.93	0.02Leader-like
367	XLOC_009408	Zv9_00051377	2.4498607	0.054	0.944	0.002Leader-like

368	XLOC_014871	Zv9_00019564	2.4823171	0.342	0.56	0.098Leader-like
369	XLOC_013446	Zv9_00014382	2.49144	0.012	0.988	0Leader-like
370	XLOC_008435	Zv9_00048060	2.4950842	0.002	0.998	0Leader-like
371	XLOC_006959	Zv9_00003210	2.5345849	0	1	0Leader-like
372	XLOC_011483	Zv9_00007432	2.5960353	0.132	0.866	0.002Leader-like
373	XLOC_011560	Zv9_00007679	2.60377849	0.006	0.994	0Leader-like
374	XLOC_014909	Zv9_00019679	2.6420043	0.352	0.648	0Leader-like
375	XLOC_012651	Zv9_00011503	2.66062017	0.008	0.992	0Leader-like
376	XLOC_007497	Zv9_00005091	2.6772047	0	1	0Leader-like
377	XLOC_001885	Zv9_00027170	2.6913178	0.022	0.978	0Leader-like
378	XLOC_009833	Zv9_00052994	2.7186763	0.26	0.74	0Leader-like
379	XLOC_004354	Zv9_00036392	2.7364314	0.23	0.77	0Leader-like
380	XLOC_016018	Zv9_00023436	2.7624397	0	1	0Leader-like
381	XLOC_008355	Zv9_00047840	2.9265102	0.006	0.994	0Leader-like
382	XLOC_005475	Zv9_00040802	2.9704734	0.06	0.892	0.048Leader-like
383	XLOC_002023	Zv9_00027771	2.9835989	0.014	0.986	0Leader-like
384	XLOC_013211	Zv9_00013481	2.9896271	0.186	0.812	0.002Leader-like
385	XLOC_001390	Zv9_00025345	2.99882336	0.008	0.992	0Leader-like
386	XLOC_002510	Zv9_00029765	3.0407451	0.016	0.954	0.03Leader-like
387	XLOC_005290	Zv9_00040039	3.0876601	0.006	0.994	0Leader-like
388	XLOC_002921	Zv9_00031324	3.167395	0.092	0.908	0Leader-like
389	XLOC_010131	Zv9_00054181	3.2422286	0.044	0.956	0Leader-like
390	XLOC_003893	Zv9_00034705	3.242782	0.07	0.89	0.04Leader-like
391	XLOC_000214	Zv9_00058238	3.249347	0	0.998	0.002Leader-like
392	XLOC_008038	Zv9_00046723	3.2693669	0.086	0.914	0Leader-like
393	XLOC_012232	Zv9_00010001	3.2714495	0.176	0.824	0Leader-like
394	XLOC_010092	Zv9_00054010	3.2807821	0.116	0.884	0Leader-like
395	XLOC_010298	Zv9_00054881	3.325683	0.006	0.988	0.006Leader-like
396	XLOC_012313	Zv9_00010462	3.3291761	0.124	0.876	0Leader-like
397	XLOC_011958	Zv9_00008968	3.4181227	0.008	0.992	0Leader-like
398	XLOC_000121	Zv9_00058634	3.43333577	0.004	0.996	0Leader-like
399	XLOC_012855	Zv9_00012321	3.45218229	0.058	0.94	0.002Leader-like
400	XLOC_013804	Zv9_00015709	3.46190582	0.026	0.966	0.008Leader-like
401	XLOC_003588	Zv9_00033639	3.48719021	0.144	0.85	0.006Leader-like
402	XLOC_015848	Zv9_00022881	3.5008965	0.188	0.742	0.07Leader-like
403	XLOC_000230	Zv9_00057801	3.5176759	0.032	0.968	0Leader-like
404	XLOC_013149	Zv9_00013287	3.53965404	0.012	0.988	0Leader-like
405	XLOC_012618	Zv9_00011412	3.67125705	0.262	0.686	0.052Leader-like
406	XLOC_007850	Zv9_00046102	3.69970377	0.196	0.804	0Leader-like
407	XLOC_015913	Zv9_00023143	3.70682	0.208	0.726	0.066Leader-like
408	XLOC_001376	Zv9_00025303	3.7237175	0.048	0.952	0Leader-like
409	XLOC_009661	Zv9_00052311	3.7516132	0.064	0.618	0.318Leader-like
410	XLOC_000713	Zv9_00001621	3.7997229	0.072	0.926	0.002Leader-like
411	XLOC_013908	Zv9_00016101	3.8277005	0.01	0.926	0.064Leader-like
412	XLOC_010432	Zv9_00055436	3.8366931	0	0.992	0.008Leader-like
413	XLOC_011427	Zv9_00007249	3.9345719	0.214	0.784	0.002Leader-like
414	XLOC_004166	Zv9_00035708	3.96538362	0.002	0.998	0Leader-like
415	XLOC_010022	Zv9_00053751	3.988422	0.168	0.832	0Leader-like
416	XLOC_004643	Zv9_00037486	4.017417	0	1	0Leader-like
417	XLOC_002565	Zv9_00030004	4.0557196	0.022	0.978	0Leader-like
418	XLOC_016116	Zv9_00023789	4.0869549	0	1	0Leader-like
419	XLOC_007871	Zv9_00046175	4.1325519	0.076	0.924	0Leader-like
420	XLOC_010179	Zv9_00054435	4.259471	0.462	0.538	0Leader-like
421	XLOC_005076	Zv9_00039192	4.273444	0.242	0.444	0.314Leader-like
422	XLOC_005313	Zv9_00040143	4.442762	0.048	0.952	0Leader-like

423	XLOC_010600	Zv9_00056152	4.4928813	0.018	0.982	0Leader-like
424	XLOC_004532	Zv9_00037093	4.528806	0.098	0.498	0.404Leader-like
425	XLOC_002383	Zv9_00029355	4.546796	0.13	0.87	0Leader-like
426	XLOC_005414	Zv9_00040525	4.5703824	0.394	0.596	0.01Leader-like
427	XLOC_006610	Zv9_00044678	4.5845461	0.182	0.818	0Leader-like
428	XLOC_000037	Zv9_00058487	4.65092661	0.012	0.988	0Leader-like
429	XLOC_008490	Zv9_00048217	4.666695	0.006	0.984	0.01Leader-like
430	XLOC_011289	Zv9_00006683	4.6687684	0.29	0.71	0Leader-like
431	XLOC_013734	Zv9_00015411	4.743831	0.056	0.944	0Leader-like
432	XLOC_004269	Zv9_00036037	4.7809066	0.488	0.512	0Leader-like
433	XLOC_000292	Zv9_00000127	4.96958968	0.062	0.934	0.004Leader-like
434	XLOC_015923	Zv9_00023185	5.023893	0	1	0Leader-like
435	XLOC_000607	Zv9_00001205	5.0470297	0.036	0.964	0Leader-like
436	XLOC_006329	Zv9_00043762	5.061597	0.062	0.782	0.156Leader-like
437	XLOC_002018	Zv9_00027739	5.0981935	0.004	0.996	0Leader-like
438	XLOC_003884	Zv9_00034692	5.1226788	0	1	0Leader-like
439	XLOC_012210	Zv9_00009908	5.2468713	0.006	0.994	0Leader-like
440	XLOC_008372	Zv9_00047897	5.2605173	0.006	0.994	0Leader-like
441	XLOC_005182	Zv9_00039574	5.26805314	0.06	0.936	0.004Leader-like
442	XLOC_005692	Zv9_00041667	5.3382788	0.044	0.956	0Leader-like
443	XLOC_008752	Zv9_00049090	5.344558	0.002	0.998	0Leader-like
444	XLOC_011718	Zv9_00008272	5.4074581	0.002	0.998	0Leader-like
445	XLOC_008971	Zv9_00049961	5.4370099	0.042	0.954	0.004Leader-like
446	XLOC_003136	Zv9_00032053	5.5331038	0.066	0.934	0Leader-like
447	XLOC_009394	Zv9_00051330	6.04478963	0.132	0.868	0Leader-like
448	XLOC_007840	Zv9_00046060	6.102765	0.002	0.998	0Leader-like
449	XLOC_009449	Zv9_00051614	6.1254572	0.188	0.618	0.194Leader-like
450	XLOC_001667	Zv9_00026365	6.1720688	0.088	0.912	0Leader-like
451	XLOC_011846	Zv9_00008643	6.20527099	0.104	0.896	0Leader-like
452	XLOC_011991	Zv9_00009177	6.2057415	0.008	0.992	0Leader-like
453	XLOC_004762	Zv9_00037899	6.326055	0.026	0.944	0.03Leader-like
454	XLOC_000053	Zv9_00058526	6.41099417	0.272	0.728	0Leader-like
455	XLOC_000217	Zv9_00058240	6.597646	0.006	0.994	0Leader-like
456	XLOC_007452	Zv9_00004937	6.65729	0.066	0.818	0.116Leader-like
457	XLOC_004217	Zv9_00035902	6.93802	0	1	0Leader-like
458	XLOC_001477	Zv9_00025662	6.95937	0.028	0.972	0Leader-like
459	XLOC_004985	Zv9_00038770	6.962514	0	1	0Leader-like
460	XLOC_006756	Zv9_00002565	7.043637	0.006	0.994	0Leader-like
461	XLOC_006546	Zv9_00044488	7.1732169	0.28	0.698	0.022Leader-like
462	XLOC_006561	Zv9_00044534	7.1954571	0.128	0.87	0.002Leader-like
463	XLOC_001222	Zv9_00024668	7.213794	0.024	0.976	0Leader-like
464	XLOC_004549	Zv9_00037144	7.4377846	0.202	0.798	0Leader-like
465	XLOC_007146	Zv9_00003971	7.4828937	0.02	0.978	0.002Leader-like
466	XLOC_007310	Zv9_00004450	7.5549366	0.058	0.942	0Leader-like
467	XLOC_001558	Zv9_00025966	7.676304	0	1	0Leader-like
468	XLOC_004011	Zv9_00035134	7.718631	0.06	0.94	0Leader-like
469	XLOC_008186	Zv9_00047125	8.0202235	0.016	0.964	0.02Leader-like
470	XLOC_004222	Zv9_00035926	8.121872	0.012	0.986	0.002Leader-like
471	XLOC_000734	Zv9_00001692	8.16756377	0.01	0.988	0.002Leader-like
472	XLOC_001327	Zv9_00025103	8.1744968	0.112	0.68	0.208Leader-like
473	XLOC_007771	Zv9_00045891	8.3081198	0	0.998	0.002Leader-like
474	XLOC_003395	Zv9_00033030	8.520677	0.036	0.964	0Leader-like
475	XLOC_002201	Zv9_00028519	8.6200702	0.024	0.976	0Leader-like
476	XLOC_001999	Zv9_00027660	8.6673242	0.056	0.934	0.01Leader-like
477	XLOC_003706	Zv9_00034055	8.674641	0.006	0.99	0.004Leader-like

478	XLOC_001771	Zv9_00026768	8.6838351	0	1	0Leader-like
479	XLOC_002388	Zv9_00029365	8.7666038	0	1	0Leader-like
480	XLOC_009572	Zv9_00052074	8.9568969	0.024	0.976	0Leader-like
481	XLOC_004334	Zv9_00036288	8.9569727	0.002	0.994	0.004Leader-like
482	XLOC_008904	Zv9_00049673	8.985924	0.09	0.746	0.164Leader-like
483	XLOC_002298	Zv9_00028931	9.014754	0.004	0.996	0Leader-like
484	XLOC_015782	Zv9_00022610	9.1508372	0	1	0Leader-like
485	XLOC_010182	Zv9_00054443	9.263515	0	1	0Leader-like
486	XLOC_004794	Zv9_00038023	9.63520161	0	1	0Leader-like
487	XLOC_006360	Zv9_00043873	9.8339353	0.046	0.95	0.004Leader-like
488	XLOC_002596	Zv9_00030138	9.8723861	0.044	0.944	0.012Leader-like
489	XLOC_015674	Zv9_00022242	9.995298	0	1	0Leader-like
490	XLOC_005610	Zv9_00041403	10.2606914	0.02	0.972	0.008Leader-like
491	XLOC_015424	Zv9_00021305	10.733602	0.002	0.996	0.002Leader-like
492	XLOC_004033	Zv9_00035253	10.7478868	0.066	0.694	0.24Leader-like
493	XLOC_015212	Zv9_00020637	10.918396	0.04	0.916	0.044Leader-like
494	XLOC_015999	Zv9_00023382	11.447087	0.002	0.998	0Leader-like
495	XLOC_002256	Zv9_00028729	11.915208	0.236	0.758	0.006Leader-like
496	XLOC_014389	Zv9_00017913	12.2988516	0.058	0.898	0.044Leader-like
497	XLOC_007584	Zv9_00045339	12.43439	0.256	0.73	0.014Leader-like
498	XLOC_013502	Zv9_00014610	12.501078	0.106	0.894	0Leader-like
499	XLOC_009071	Zv9_00050227	12.50904374	0	1	0Leader-like
500	XLOC_012886	Zv9_00012411	12.6112496	0.03	0.97	0Leader-like
501	XLOC_012051	Zv9_00009452	12.911338	0	1	0Leader-like
502	XLOC_008364	Zv9_00047868	13.1761834	0	1	0Leader-like
503	XLOC_010223	Zv9_00054601	14.29883	0.138	0.862	0Leader-like
504	XLOC_002080	Zv9_00028052	14.459312	0	1	0Leader-like
505	XLOC_011783	Zv9_00008492	14.671283	0.04	0.948	0.012Leader-like
506	XLOC_015602	Zv9_00022003	15.07503842	0	1	0Leader-like
507	XLOC_013519	Zv9_00014672	15.139083	0.358	0.584	0.058Leader-like
508	XLOC_011476	Zv9_00007415	15.2104209	0.028	0.972	0Leader-like
509	XLOC_015200	Zv9_00020575	15.21796	0.412	0.586	0.002Leader-like
510	XLOC_005953	Zv9_00042599	15.2678468	0.002	0.998	0Leader-like
511	XLOC_007654	Zv9_00045541	16.491847	0.056	0.914	0.03Leader-like
512	XLOC_005041	Zv9_00039015	17.112721	0.036	0.964	0Leader-like
513	XLOC_015540	Zv9_00021714	18.5108999	0	1	0Leader-like
514	XLOC_010608	Zv9_00056167	18.635354	0.008	0.866	0.126Leader-like
515	XLOC_011077	Zv9_00005917	18.9156881	0.178	0.754	0.068Leader-like
516	XLOC_003056	Zv9_00031795	19.7219994	0	1	0Leader-like
517	XLOC_008110	Zv9_00046921	20.00513227	0.13	0.87	0Leader-like
518	XLOC_003744	Zv9_00034192	20.187642	0.356	0.64	0.004Leader-like
519	XLOC_009672	Zv9_00052370	20.392487	0.002	0.998	0Leader-like
520	XLOC_006603	Zv9_00044651	20.531462	0.002	0.998	0Leader-like
521	XLOC_001505	Zv9_00025745	20.54288	0.05	0.95	0Leader-like
522	XLOC_002724	Zv9_00030633	21.085909	0.288	0.594	0.118Leader-like
523	XLOC_009341	Zv9_00051140	21.145255	0	0.998	0.002Leader-like
524	XLOC_007833	Zv9_00046047	21.3581285	0.008	0.992	0Leader-like
525	XLOC_007414	Zv9_00004784	22.6187602	0.01	0.99	0Leader-like
526	XLOC_011089	Zv9_00005961	24.55229185	0	1	0Leader-like
527	XLOC_012775	Zv9_00011954	24.75164381	0	1	0Leader-like
528	XLOC_005954	Zv9_00042604	28.4068316	0.016	0.984	0Leader-like
529	XLOC_002592	Zv9_00030125	30.28547	0.004	0.94	0.056Leader-like
530	XLOC_001552	Zv9_00025931	30.4861954	0	1	0Leader-like
531	XLOC_014228	Zv9_00017259	31.690417	0.096	0.904	0Leader-like
532	XLOC_015788	Zv9_00022628	32.249941	0	0.998	0.002Leader-like

533	XLOC_002722	Zv9_00030627	32.5969884	0	1	0Leader-like
534	XLOC_000021	Zv9_00057916	34.5616185	0	0.996	0.004Leader-like
535	XLOC_009214	Zv9_00050728	38.325013	0.378	0.622	0Leader-like
536	XLOC_000312	Zv9_00000167	39.6929	0.426	0.466	0.108Leader-like
537	XLOC_003593	Zv9_00033658	43.41854	0.004	0.996	0Leader-like
538	XLOC_008665	Zv9_00048852	44.3828832	0.002	0.998	0Leader-like
539	XLOC_004717	Zv9_00037732	45.0367933	0	0.996	0.004Leader-like
540	XLOC_013584	Zv9_00014853	45.203532	0.128	0.612	0.26Leader-like
541	XLOC_008513	Zv9_00048292	49.20164	0.492	0.508	0Leader-like
542	XLOC_007387	Zv9_00004701	52.42374	0.006	0.986	0.008Leader-like
543	XLOC_014520	Zv9_00018277	55.1180032	0.002	0.998	0Leader-like
544	XLOC_005565	Zv9_00041220	55.837282	0.298	0.588	0.114Leader-like
545	XLOC_006249	Zv9_00043518	59.64654547	0	1	0Leader-like
546	XLOC_011965	Zv9_00009030	66.5487198	0.006	0.994	0Leader-like
547	XLOC_009210	Zv9_00050700	70.0251452	0	0.99	0.01Leader-like
548	XLOC_002634	Zv9_00030320	79.3304762	0	0.998	0.002Leader-like
549	XLOC_005104	Zv9_00039287	79.75907	0.444	0.556	0Leader-like
550	XLOC_009920	Zv9_00053302	106.8412477	0.004	0.996	0Leader-like
551	XLOC_008222	Zv9_00047229	173.619106	0.132	0.866	0.002Leader-like
552	XLOC_001359	Zv9_00025214	188.1069	0.002	0.998	0Leader-like
553	XLOC_015262	Zv9_00020821	311.593169	0	1	0Leader-like
554	XLOC_006529	Zv9_00044431	397.70705	0	1	0Leader-like
555	XLOC_003759	Zv9_00034241	1078.04323	0.204	0.796	0Leader-like
556	XLOC_004004	Zv9_00035097	1.3567541	0.016	0.222	0.762Coding
557	XLOC_000033	Zv9_00057349	1.8965754	0.002	0.37	0.628Coding
558	XLOC_005840	Zv9_00042206	2.052558	0.182	0.354	0.464Coding
559	XLOC_002992	Zv9_00031572	2.5587812	0.046	0.336	0.618Coding
560	XLOC_002221	Zv9_00028600	2.725521	0	0.28	0.72Coding
561	XLOC_003868	Zv9_00034646	2.8464983	0.016	0.356	0.628Coding
562	XLOC_005827	Zv9_00042153	2.8981115	0.046	0.204	0.75Coding
563	XLOC_015693	Zv9_00022307	3.3292844	0.144	0.218	0.638Coding
564	XLOC_001517	Zv9_00025791	3.392814	0.018	0.292	0.69Coding
565	XLOC_003924	Zv9_00034838	3.5879869	0	0.236	0.764Coding
566	XLOC_004614	Zv9_00037383	4.181527	0.03	0.468	0.502Coding
567	XLOC_011166	Zv9_00006258	4.5557923	0.016	0.288	0.696Coding
568	XLOC_005771	Zv9_00041874	4.867899	0	0.238	0.762Coding
569	XLOC_003290	Zv9_00032675	5.024178	0	0.222	0.778Coding
570	XLOC_006566	Zv9_00044551	6.171558	0	0.136	0.864Coding
571	XLOC_015311	Zv9_00020981	7.55166	0.018	0.082	0.9Coding
572	XLOC_000005	Zv9_00058396	7.729297	0.184	0.374	0.442Coding
573	XLOC_006538	Zv9_00044467	7.733404	0.074	0.418	0.508Coding
574	XLOC_006039	Zv9_00042842	8.126586	0.092	0.308	0.6Coding
575	XLOC_002650	Zv9_00030367	8.487948	0	0.006	0.994Coding
576	XLOC_001276	Zv9_00024864	9.643782	0.192	0.178	0.63Coding
577	XLOC_007216	Zv9_00004150	10.755369	0.004	0.326	0.67Coding
578	XLOC_014434	Zv9_00018057	11.043864	0	0.12	0.88Coding
579	XLOC_002564	Zv9_00029999	11.2544091	0.096	0.38	0.524Coding
580	XLOC_001224	Zv9_00024673	11.639026	0	0.048	0.952Coding
581	XLOC_010136	Zv9_00054214	11.84479	0.02	0.476	0.504Coding
582	XLOC_015406	Zv9_00021248	12.2935259	0.046	0.408	0.546Coding
583	XLOC_005751	Zv9_00041815	12.78148365	0.198	0.284	0.518Coding
584	XLOC_004683	Zv9_00037626	14.1070173	0	0.008	0.992Coding
585	XLOC_007518	Zv9_00005205	14.361285	0	0.042	0.958Coding
586	XLOC_000977	Zv9_00002559	15.71514	0.002	0.126	0.872Coding
587	XLOC_004049	Zv9_00035330	21.34658	0.002	0.092	0.906Coding

588	XLOC_004930	Zv9_00038563	26.24835	0.002	0.354	0.644Coding
589	XLOC_000198	Zv9_00058196	28.5328354	0.232	0.266	0.502Coding
590	XLOC_009981	Zv9_00053557	34.77061	0.166	0.246	0.588Coding
591	XLOC_002096	Zv9_00028138	38.62973	0	0.02	0.98Coding
592	XLOC_002904	Zv9_00031256	41.4699498	0.004	0.218	0.778Coding
593	XLOC_006755	Zv9_00045093	47.148359	0.028	0.342	0.63Coding
594	XLOC_012353	Zv9_00010606	51.4442	0.008	0.134	0.858Coding
595	XLOC_000035	Zv9_00057973	57.5244	0	0.12	0.88Coding
596	XLOC_000316	Zv9_00000174	59.3678911	0.002	0.032	0.966Coding
597	XLOC_000019	Zv9_00057323	72.09165	0.002	0.11	0.888Coding
598	XLOC_008783	Zv9_00049191	72.23685	0.006	0.308	0.686Coding
599	XLOC_014208	Zv9_00017190	79.2597358	0	0	1Coding
600	XLOC_002027	Zv9_00027779	112.91106	0.152	0.328	0.52Coding
601	XLOC_002891	Zv9_00031207	126.469244	0.008	0.07	0.922Coding
602	XLOC_001758	Zv9_00026705	135.84522	0.178	0.31	0.512Coding
603	XLOC_003220	Zv9_00032370	161.57448	0.004	0.294	0.702Coding
604	XLOC_002920	Zv9_00031321	203.499603	0.198	0.038	0.764Coding
605	XLOC_001882	Zv9_00027164	216.544007	0	0.006	0.994Coding
606	XLOC_005023	Zv9_00038944	380.5486	0.012	0.01	0.978Coding
607	XLOC_005031	Zv9_00038978	506.80071	0	0	1Coding
608	XLOC_010160	Zv9_00054343	556.65686	0.022	0.008	0.97Coding

**Table S3. TOC predictions for lncRNAs from Ulitsky et al., 2011**

TOC was used to classify proposed zebrafish lncRNAs from Ulitsky et al., 2011. Listed are the name of the locus (XLOC\_xxx), the transcript identifier and the RNA-Seq based expression level in fragments per kilobase of exon per million fragments mapped (FPKM). For the most coding-like ORF (for predicted coding transcripts) or leader-like ORF (for predicted leader-like or trailer-like transcripts) within a transcript, the list shows the relative frequency of trees that classify that ORF as trailer, leader or coding. Note that this ORF may not necessarily be the longest or the most RPF-dense ORF within the locus. The last column contains the resulting TOC-based classification for the particular transcript. Transcript structures with all associated metadata (chromosome start/end, strand, locus name, isoform name, exon-intron structure) are accessible as GTF files at Gene Expression Omnibus (GEO) (accession number GSE46512).

	Locus	Transcript	FPKM	Trailer	Leader	Coding	Prediction
1	XLOC_003338	linc-loc563932_1	1.02832353	1	0	0	0Trailer-like
2	XLOC_007630	linc-six1b_1	1.0426557	1	0	0	0Trailer-like
3	XLOC_011092	linc-arl6ip1_2	1.06349645	0.722	0.278	0	0Trailer-like
4	XLOC_010285	linc-fam164a_2_1	1.1753453	1	0	0	0Trailer-like
5	XLOC_002703	linc-wu:fc09a11_1	1.1772022	1	0	0	0Trailer-like
6	XLOC_007184	linc-dis3l2_1	1.2271673	0.798	0.202	0	0Trailer-like
7	XLOC_003234	linc-loc100333296_1	1.237194	1	0	0	0Trailer-like
8	XLOC_002640	linc-meis1_1	1.2744843	1	0	0	0Trailer-like
9	XLOC_015869	linc-ihha_1	1.2963935	0.834	0.166	0	0Trailer-like
10	XLOC_013879	linc-srsf3a_1	1.30493786	1	0	0	0Trailer-like
11	XLOC_011738	linc-foxp2_1	1.3132349	1	0	0	0Trailer-like
12	XLOC_002337	linc-zgc:194486_1	1.3427258	0.906	0.092	0.002	0Trailer-like
13	XLOC_010337	linc-zgc:92458_1	1.424449429	1	0	0	0Trailer-like
14	XLOC_006917	linc-zgc:153637_1	1.5231788	0.638	0.186	0.176	0Trailer-like
15	XLOC_009260	linc-ahr2_1	1.66097577	0.702	0.298	0	0Trailer-like
16	XLOC_003708	linc-adrb2a_1	1.72534844	1	0	0	0Trailer-like
17	XLOC_010359	linc-klhl14_1	1.8025996	1	0	0	0Trailer-like
18	XLOC_016059	linc-gabpa_1	1.95313238	0.918	0.082	0	0Trailer-like
19	XLOC_012631	linc-tars_1	1.9632785	0.966	0.034	0	0Trailer-like
20	XLOC_009582	linc-casz1_1	2.0734445	0.994	0.006	0	0Trailer-like
21	XLOC_000496	linc-b8a4r6_danre_1	2.2596556	0.752	0.23	0.018	0Trailer-like
22	XLOC_010722	linc-im:7145024_1	2.4175612	0.664	0.334	0.002	0Trailer-like
23	XLOC_004271	linc-arl4a_1	2.522661	0.914	0.086	0	0Trailer-like
24	XLOC_011975	linc-loc100001765_1	2.57446719	1	0	0	0Trailer-like
25	XLOC_000777	linc-anp32b_3	2.6007957	0.994	0.006	0	0Trailer-like
26	XLOC_011787	linc-zgc:63566_1	2.6025037	1	0	0	0Trailer-like
27	XLOC_010197	linc-adarb2_1	2.639227	0.998	0.002	0	0Trailer-like
28	XLOC_007373	linc-si:dkey-193b15.6_1	2.9988947	1	0	0	0Trailer-like
29	XLOC_006210	linc-hoxa3a_1	3.0705964	0.968	0.032	0	0Trailer-like
30	XLOC_006547	linc-hoxa3a_2_1	3.08751721	0.884	0.116	0	0Trailer-like
31	XLOC_006400	linc-gpd1_1	3.14883945	0.702	0.152	0.146	0Trailer-like
32	XLOC_009640	linc-hoxc1a_1	3.22592314	1	0	0	0Trailer-like
33	XLOC_009895	linc-nr4a1_1	3.2716755	1	0	0	0Trailer-like
34	XLOC_011804	linc-pus7l_(1_of_3)_1	3.3067262	0.764	0.088	0.148	0Trailer-like
35	XLOC_001839	linc-zgc:66127_1	3.399651	0.846	0.154	0	0Trailer-like
36	XLOC_003522	linc-trpc7_1	3.48593045	0.892	0.106	0.002	0Trailer-like

37	XLOC_013192	linc-tbx2a_1	3.5626439	1	0	0Trailer-like
38	XLOC_013132	linc-zgc:100930_3_1	3.5796523	0.88	0.12	0Trailer-like
39	XLOC_009939	linc-elovl4b_1	3.6326382	1	0	0Trailer-like
40	XLOC_004386	linc-trim71_1	3.7646588	1	0	0Trailer-like
41	XLOC_011701	linc-arid2_2	3.849897	0.526	0.302	0.172Trailer-like
42	XLOC_004994	linc-rbm24b_1	4.03788422	0.866	0.134	0Trailer-like
43	XLOC_010945	linc-slc9a3r2__(2_of_3)_1	4.1937986	0.998	0.002	0Trailer-like
44	XLOC_001588	linc-zgc:100909_2	4.889172	0.654	0.344	0.002Trailer-like
45	XLOC_011071	linc-tom1_1	5.2338246	0.522	0.478	0Trailer-like
46	XLOC_011005	linc-ubtf_2	5.274727	0.504	0.494	0.002Trailer-like
47	XLOC_001659	linc-cnnm3_2	5.343327	0.726	0.274	0Trailer-like
48	XLOC_013752	linc-pou3f3b_2_1	5.5023425	0.514	0.486	0Trailer-like
49	XLOC_004593	linc-rbms3_1	5.5434412	1	0	0Trailer-like
50	XLOC_015196	linc-bnip3la_1	5.70988603	1	0	0Trailer-like
51	XLOC_013156	linc-nr2f1a_1	5.73866378	0.666	0.334	0Trailer-like
52	XLOC_003352	linc-archgef37_1	6.038752	0.788	0.174	0.038Trailer-like
53	XLOC_005286	linc-asb2b_1	6.1307168	1	0	0Trailer-like
54	XLOC_006566	linc-tshz1_1	6.171558	0.914	0.086	0Trailer-like
55	XLOC_012472	linc-lman2lb_1	6.5478745	0.884	0.116	0Trailer-like
56	XLOC_013476	linc-bcl6a_1	7.4236326	0.996	0.004	0Trailer-like
57	XLOC_014463	linc-zgc:112142_1	8.00696063	0.746	0.252	0.002Trailer-like
58	XLOC_005785	linc-pex16_1	8.5182605	0.958	0.04	0.002Trailer-like
59	XLOC_004053	linc-zgc:158647_1	9.4648974	1	0	0Trailer-like
60	XLOC_001038	linc-ca9_1	9.682703	0.978	0.022	0Trailer-like
61	XLOC_007476	linc-ghrhr_1	13.6866688	1	0	0Trailer-like
62	XLOC_005849	linc-dnaja2l_2	13.856592	0.936	0.064	0Trailer-like
63	XLOC_000304	linc-zgc:77005_1	14.9139866	0.876	0.124	0Trailer-like
64	XLOC_007499	linc-jund_1	15.104697	1	0	0Trailer-like
65	XLOC_001020	linc-loc561183_1	16.474342	0.632	0.158	0.21Trailer-like
66	XLOC_011132	linc-carm1_1	17.6241727	0.584	0.416	0Trailer-like
67	XLOC_006380	linc-zgc:92022_1	24.737839	0.926	0.074	0Trailer-like
68	XLOC_003380	linc-cfl2l_1	26.170544	1	0	0Trailer-like
69	XLOC_013753	linc-pou3f3b_1	27.765557	1	0	0Trailer-like
70	XLOC_008578	linc-kiaa1432_1	29.659719	1	0	0Trailer-like
71	XLOC_009186	linc-zgc:123349_1	30.09301	1	0	0Trailer-like
72	XLOC_004971	linc-rpz_1	34.923526	0.97	0.02	0.01Trailer-like
73	XLOC_008010	linc-si:rp71-4m17.1_1	35.759111	0.866	0.134	0Trailer-like
74	XLOC_012543	linc-a2bhd7_danre_1	37.7745282	1	0	0Trailer-like
75	XLOC_013258	linc-nrarpb_1	43.4922986	1	0	0Trailer-like
76	XLOC_014010	linc-loc557798_1	97.81982	1	0	0Trailer-like
77	XLOC_009920	linc-hoxc6a_1	106.8412477	1	0	0Trailer-like
78	XLOC_003108	linc-tmemb39b(cyrano)_1	123.00293	0.984	0.016	0Trailer-like
79	XLOC_007114	linc-twsg1a_1	223.20074	1	0	0Trailer-like
80	XLOC_001288	linc-epb4.114_1	224.81306	0.92	0.08	0Trailer-like
81	XLOC_004459	linc-otoa_1	1.0546459	0	0.99	0.01Leader-like
82	XLOC_001910	linc-wu:fc28f08_1	1.0985919	0.006	0.528	0.466Leader-like
83	XLOC_008547	linc-loc563783_1	1.1047153	0.088	0.892	0.02Leader-like
84	XLOC_003684	linc-sox3_1	1.1166627	0.116	0.848	0.036Leader-like
85	XLOC_008939	linc-loc100006557_1	1.12148877	0.016	0.708	0.276Leader-like
86	XLOC_008508	linc-loc557064_2	1.15264745	0.006	0.994	0Leader-like
87	XLOC_009544	linc-q58ee7_danre_1	1.1963674	0.038	0.962	0Leader-like
88	XLOC_006695	linc-si:dkeyp-66g8.1_1	1.2089249	0.008	0.992	0Leader-like
89	XLOC_004970	linc-mtmr11_1	1.2106429	0.042	0.958	0Leader-like
90	XLOC_004569	linc-loc100329297_2	1.21104132	0.196	0.782	0.022Leader-like
91	XLOC_000346	linc-xpa_1	1.2180429	0.166	0.834	0Leader-like

92	XLOC_014351	linc-zgc:101653_1	1.29781231	0.282	0.708	0.01Leader-like
93	XLOC_015819	linc-zgc:158316_1	1.3321122	0.054	0.946	0Leader-like
94	XLOC_012763	linc-zgc:158317_1	1.3523416	0.006	0.994	0Leader-like
95	XLOC_003246	linc-gabra2__(2_of_3)_1	1.380774194	0.102	0.898	0Leader-like
96	XLOC_015867	linc-creg2_1	1.3885485	0.316	0.346	0.338Leader-like
97	XLOC_012128	linc-pus7l_1	1.45505133	0.048	0.948	0.004Leader-like
98	XLOC_008297	linc-cdk9_1	1.4582659	0.004	0.996	0Leader-like
99	XLOC_013240	linc-loc100331916_1	1.4759021	0.118	0.882	0Leader-like
100	XLOC_015201	linc-lrrtm412_1	1.481703	0.006	0.994	0Leader-like
101	XLOC_005821	linc-zgc:158458_1	1.49173447	0.244	0.544	0.212Leader-like
102	XLOC_010184	linc-napgl_1	1.52314343	0	1	0Leader-like
103	XLOC_008579	linc-txn1l_1	1.587575	0.034	0.966	0Leader-like
104	XLOC_015010	linc-me3r_1	1.59740169	0.016	0.984	0Leader-like
105	XLOC_003622	linc-cpeb4_1	1.6807823	0.336	0.476	0.188Leader-like
106	XLOC_002421	linc-zgc:171432_1	1.6945583	0.152	0.778	0.07Leader-like
107	XLOC_010191	linc-zgc:92030_1	1.7240712	0.04	0.96	0Leader-like
108	XLOC_007643	linc-rasl11b_3	1.7352838	0	1	0Leader-like
109	XLOC_005060	linc-arid4a_1	1.7647158	0.13	0.848	0.022Leader-like
110	XLOC_012188	linc-impdh1b_1	1.78472933	0.124	0.64	0.236Leader-like
111	XLOC_012976	linc-zfand5a_1	1.8726721	0.13	0.842	0.028Leader-like
112	XLOC_006415	linc-osbp1l0_(1_of_2)_1	1.9167042	0.098	0.902	0Leader-like
113	XLOC_002556	linc-loc100334139_1	1.9646057	0.01	0.99	0Leader-like
114	XLOC_012959	linc-atp6v1al_1	1.9697837	0.17	0.828	0.002Leader-like
115	XLOC_006801	linc-zgc:175148_1	1.986941	0.05	0.95	0Leader-like
116	XLOC_000688	linc-zgc:103678_1	2.0697627	0.002	0.998	0Leader-like
117	XLOC_004803	linc-otoa_2	2.0698347	0.004	0.996	0Leader-like
118	XLOC_009770	linc-loc569344_1	2.13654367	0.288	0.704	0.008Leader-like
119	XLOC_006268	linc-sox4a_2	2.22769321	0.006	0.988	0.006Leader-like
120	XLOC_014340	linc-b0ux50_danre_1	2.25728	0	1	0Leader-like
121	XLOC_005959	linc-si:dkeyp-59c12.1_1	2.2616039	0.062	0.916	0.022Leader-like
122	XLOC_013917	linc-ctsz_1	2.2635818	0.36	0.458	0.182Leader-like
123	XLOC_012537	linc-ptges_1	2.26430971	0.044	0.952	0.004Leader-like
124	XLOC_004147	linc-trappc6bl_2_1	2.269677	0.014	0.678	0.308Leader-like
125	XLOC_003882	linc-c11orf53_(2_of_2)_1	2.45413306	0.322	0.592	0.086Leader-like
126	XLOC_002971	linc-six3a_1	2.4596459	0.032	0.968	0Leader-like
127	XLOC_005181	linc-g2e3_1	2.461541	0.026	0.844	0.13Leader-like
128	XLOC_012086	linc-stab2_1	2.4661962	0.11	0.882	0.008Leader-like
129	XLOC_011866	linc-guca1a_1	2.4680412	0.06	0.94	0Leader-like
130	XLOC_001958	linc-kdm5ba_1	2.471797	0.026	0.876	0.098Leader-like
131	XLOC_007006	linc-tnw_1	2.5136181	0.096	0.904	0Leader-like
132	XLOC_002538	linc-loc100004911_1	2.5172519	0.046	0.942	0.012Leader-like
133	XLOC_014937	linc-si:dkey-23c22.6_2	2.5658727	0	1	0Leader-like
134	XLOC_011224	linc-zgc:153426_1	2.5943293	0.01	0.986	0.004Leader-like
135	XLOC_016073	linc-hibch_1	2.6103113	0.062	0.938	0Leader-like
136	XLOC_011592	linc-axin1_1	2.6433725	0.004	0.992	0.004Leader-like
137	XLOC_012262	linc-zgc:174696_1	2.659549	0	1	0Leader-like
138	XLOC_009919	linc-hoxc9a_1	2.6805247	0.144	0.832	0.024Leader-like
139	XLOC_002706	linc-c10orf11_1	2.688235	0.074	0.926	0Leader-like
140	XLOC_009814	linc-dpm1_1	2.694365	0.016	0.984	0Leader-like
141	XLOC_001014	linc-snX30_1	2.77502661	0.004	0.994	0.002Leader-like
142	XLOC_011667	linc-zgc:194562_2	2.8889572	0	0.994	0.006Leader-like
143	XLOC_015363	linc-rhoad_1	2.9752598	0.294	0.706	0Leader-like
144	XLOC_010058	linc-loc556735_1	2.9945627	0	0.996	0.004Leader-like
145	XLOC_005036	linc-zgc:112161_1	3.1198091	0.062	0.938	0Leader-like
146	XLOC_008583	linc-si:rp71-1h20.5_1	3.2184663	0.038	0.922	0.04Leader-like

147	XLOC_011666	linc-zgc:194562_1	3.29457668	0.084	0.916	0Leader-like
148	XLOC_012371	linc-cabp7_(2_of_2)_1	3.3281833	0	1	0Leader-like
149	XLOC_015478	linc-prdm16_1	3.3540217	0.38	0.596	0.024Leader-like
150	XLOC_014339	linc-loc563901_1	3.362346	0	1	0Leader-like
151	XLOC_011434	linc-hoxb8a_2	3.5071564	0.22	0.778	0.002Leader-like
152	XLOC_010387	linc-im:7147678_1	3.7611453	0.056	0.942	0.002Leader-like
153	XLOC_006986	linc-mycb_1	3.7708942	0.366	0.634	0Leader-like
154	XLOC_000368	linc-loc557250_1	3.78887004	0.002	0.998	0Leader-like
155	XLOC_004651	linc-loc567622_1	3.7900788	0.014	0.986	0Leader-like
156	XLOC_000713	linc-fat1_1	3.7997229	0.358	0.596	0.046Leader-like
157	XLOC_011070	linc-gcat_1	3.8507782	0.088	0.908	0.004Leader-like
158	XLOC_005682	linc-necab2_1	3.971953	0	1	0Leader-like
159	XLOC_009881	linc-zgc:112481_1	4.2655424	0	1	0Leader-like
160	XLOC_004231	linc-slc6a4a_1	4.283763	0.038	0.962	0Leader-like
161	XLOC_011653	linc-zgc:165627_2_1	4.427921	0.022	0.978	0Leader-like
162	XLOC_004000	linc-loc567610_1	4.6684893	0.148	0.852	0Leader-like
163	XLOC_008915	linc-si:dkey-15h8.11_1	4.7044754	0.016	0.984	0Leader-like
164	XLOC_014264	linc-dync1li2_1	4.7790093	0.112	0.888	0Leader-like
165	XLOC_011616	linc-metrnl_1	4.8360017	0.066	0.922	0.012Leader-like
166	XLOC_011332	linc-loc798482_1	5.2636401	0.08	0.892	0.028Leader-like
167	XLOC_005692	linc-nr2f2_3	5.3382788	0.056	0.944	0Leader-like
168	XLOC_011718	linc-loc556392_2	5.4074581	0	1	0Leader-like
169	XLOC_012707	linc-zgc:194800_1	5.4584575	0.006	0.994	0Leader-like
170	XLOC_009134	linc-si:ch73-197b13.2_1	5.53824938	0.218	0.774	0.008Leader-like
171	XLOC_012287	linc-loc100331680_2_1	5.6273433	0.054	0.946	0Leader-like
172	XLOC_009492	linc-rnd1_1	5.9758775	0	1	0Leader-like
173	XLOC_009777	linc-zgc:194282_1	6.0856457	0.152	0.846	0.002Leader-like
174	XLOC_001483	linc-nrip1b_1	6.382829	0.4	0.6	0Leader-like
175	XLOC_005409	linc-birc6(megamind)_1	6.45109302	0.036	0.958	0.006Leader-like
176	XLOC_010128	linc-mmp16_(3_of_3)_1	7.0057539	0.004	0.996	0Leader-like
177	XLOC_012759	linc-zcchc8_1	7.103338	0.002	0.998	0Leader-like
178	XLOC_006561	linc-tra2a_1	7.1954571	0.112	0.888	0Leader-like
179	XLOC_004549	linc-mmss22l_1	7.4377846	0.06	0.94	0Leader-like
180	XLOC_014755	linc-cyb5b_2	7.4858711	0.004	0.996	0Leader-like
181	XLOC_015354	linc-si:dkey-20d21.7_1	7.621274	0.01	0.99	0Leader-like
182	XLOC_005747	linc-tbcb_1	7.6814114	0.024	0.976	0Leader-like
183	XLOC_002271	linc-si:busm1-64d20.2_1	7.8112975	0	1	0Leader-like
184	XLOC_002250	linc-znf646_(1_of_2)_1	7.976522	0.006	0.992	0.002Leader-like
185	XLOC_004222	linc-tbx2b_1	8.121872	0.006	0.992	0.002Leader-like
186	XLOC_006039	linc-si:dkey-223n17.1_1	8.126586	0.11	0.89	0Leader-like
187	XLOC_000734	linc-loc797069_1	8.16756377	0.014	0.986	0Leader-like
188	XLOC_003504	linc-msxe_1	8.17955	0	1	0Leader-like
189	XLOC_011493	linc-tceb2_1	8.238291	0	1	0Leader-like
190	XLOC_002484	linc-polr2a_1	8.3987409	0.484	0.516	0Leader-like
191	XLOC_002910	linc-klc1_1	8.56113	0.102	0.702	0.196Leader-like
192	XLOC_001771	linc-abhd6a_1	8.6838351	0	1	0Leader-like
193	XLOC_012980	linc-ela31_1	8.8273587	0	1	0Leader-like
194	XLOC_008846	linc-tcf7_1	8.868959	0.012	0.964	0.024Leader-like
195	XLOC_005168	linc-yth2_1	9.0127246	0.126	0.75	0.124Leader-like
196	XLOC_002298	linc-pmp22b_2	9.014754	0	1	0Leader-like
197	XLOC_013970	linc-ripk3l_1	9.05217	0.002	0.998	0Leader-like
198	XLOC_002570	linc-glrx3_1	9.101402	0.03	0.97	0Leader-like
199	XLOC_013925	linc-rbl1_1	9.229377	0.046	0.954	0Leader-like
200	XLOC_010464	linc-appl2_1	9.74238397	0.032	0.954	0.014Leader-like
201	XLOC_010025	linc-acad11_1	9.80400071	0	0.514	0.486Leader-like

202	XLOC_012856	linc-cabp7_(2_of_2)_2_1	10.284507	0.002	0.996	0.002Leader-like
203	XLOC_003547	linc-foigr_1	10.3623554	0	1	0Leader-like
204	XLOC_001977	linc-phf2_1	11.0957901	0.09	0.476	0.434Leader-like
205	XLOC_011250	linc-tex2_2	11.73295763	0	1	0Leader-like
206	XLOC_009071	linc-si:ch211-226h8.14_2	12.50904374	0	1	0Leader-like
207	XLOC_007776	linc-si:ch211-157m21.1_1	12.5311558	0.222	0.776	0.002Leader-like
208	XLOC_005751	linc-onecut1_1	12.78148365	0.014	0.986	0Leader-like
209	XLOC_012051	linc-si:dkey-14d8.21_1	12.9111338	0	1	0Leader-like
210	XLOC_000570	linc-cha_1	13.353664	0.004	0.996	0Leader-like
211	XLOC_000939	linc-pi4k2a_1	15.071629	0.124	0.876	0Leader-like
212	XLOC_011766	linc-parp12b_3	16.137169	0	1	0Leader-like
213	XLOC_011746	linc-tmnt2e_1	16.8957872	0.008	0.982	0.01Leader-like
214	XLOC_002051	linc-abhd6a_2_1	17.7802893	0	1	0Leader-like
215	XLOC_004125	linc-zgc:165596_1	19.134362	0.002	0.996	0.002Leader-like
216	XLOC_001478	linc-msi2a_1	20.16563341	0	1	0Leader-like
217	XLOC_014239	linc-tmn3b_1	20.358201	0.14	0.71	0.15Leader-like
218	XLOC_001505	linc-setd1ba_1	20.54288	0.146	0.854	0Leader-like
219	XLOC_009698	linc-st8sia7.1_2	21.0525142	0	1	0Leader-like
220	XLOC_005244	linc-ahsa11_1	24.14093	0.43	0.55	0.02Leader-like
221	XLOC_006111	linc-si:dkeyp-113d7.1_1	25.825341	0.146	0.854	0Leader-like
222	XLOC_011291	linc-loc560530_1	27.86905	0.28	0.72	0Leader-like
223	XLOC_011765	linc-zgc:85676_1	29.370431	0	1	0Leader-like
224	XLOC_011516	linc-prr14_2	36.0044799	0	1	0Leader-like
225	XLOC_003485	linc-loc792560_2	39.812166	0	1	0Leader-like
226	XLOC_008603	linc-zgc:77838_1	40.7929	0.014	0.986	0Leader-like
227	XLOC_000671	linc-tlr2_1	42.260931	0.002	0.994	0.004Leader-like
228	XLOC_004479	linc-zgc:193613_1	42.54038419	0.172	0.748	0.08Leader-like
229	XLOC_014382	linc-btr12_1	44.67733988	0.002	0.998	0Leader-like
230	XLOC_011378	linc-lasp1_1	47.6669808	0.048	0.948	0.004Leader-like
231	XLOC_001770	linc-abhd6a_3_1	48.331678	0	0.996	0.004Leader-like
232	XLOC_007387	linc-zgc:153633_2	52.42374	0.002	0.998	0Leader-like
233	XLOC_014992	linc-prkar2aa_1	65.01295	0.004	0.996	0Leader-like
234	XLOC_015559	linc-st6gal2_1	72.15527	0	0.5	0.5Leader-like
235	XLOC_013088	linc-slc12a9_1	72.985256	0	1	0Leader-like
236	XLOC_015210	linc-cxxc11_1	78.25358	0.004	0.996	0Leader-like
237	XLOC_002518	linc-cdkrap3_1	81.39735	0	0.998	0.002Leader-like
238	XLOC_013766	linc-utp6_1	85.46086	0.008	0.992	0Leader-like
239	XLOC_000904	linc-srd5a2a_1	85.59893	0	1	0Leader-like
240	XLOC_000512	linc-si:dkey-28b4.5_1	87.78311	0	1	0Leader-like
241	XLOC_004485	linc-q58ei7_danre_1	107.29192	0	1	0Leader-like
242	XLOC_011117	linc-loc100003902_1	119.93541	0	1	0Leader-like
243	XLOC_005956	linc-chd2_2	150.2576	0.002	0.998	0Leader-like
244	XLOC_016003	linc-si:dkey-100n23.5_1	162.16603	0.012	0.982	0.006Leader-like
245	XLOC_007068	linc-itgb1b.2_1	190.37307	0.326	0.674	0Leader-like
246	XLOC_015086	linc-gck_1	819.66549	0.002	0.998	0Leader-like
247	XLOC_003759	linc-loc100330612_2(malat1)_1	1078.04323	0.252	0.748	0Leader-like
248	XLOC_009912	linc-fbxo25_3	1.2429091	0.062	0.184	0.754Coding
249	XLOC_001633	linc-zgc:55741_1	1.3839385	0	0.132	0.868Coding
250	XLOC_014437	linc-zgc:113057_2_1	1.4475758	0.016	0.246	0.738Coding
251	XLOC_001360	linc-loc100329566_1	1.69370492	0.012	0.12	0.868Coding
252	XLOC_012288	linc-loc100331680_1	1.7681492	0.004	0.38	0.616Coding
253	XLOC_015780	linc-hdac4_3	1.8525518	0.026	0.286	0.688Coding
254	XLOC_008766	linc-phka1_(1_of_2)_1	1.94586989	0.174	0.256	0.57Coding
255	XLOC_003469	linc-zgc:56548_1	1.94654139	0	0.122	0.878Coding
256	XLOC_007572	linc-dher24_1	1.9996613	0.008	0.402	0.59Coding

257	XLOC_012123	linc-si:dkeyp-81f3.3_1	2.02537767	0	0.198	0.802Coding
258	XLOC_001735	linc-zgc:110815_1	2.1766556	0	0.088	0.912Coding
259	XLOC_008565	linc-np_001108140.1_1	2.20118128	0.084	0.18	0.736Coding
260	XLOC_007690	linc-btbd7_1	2.47049997	0.122	0.334	0.544Coding
261	XLOC_004898	linc-pou3f1_1	2.5954752	0.098	0.346	0.556Coding
262	XLOC_013522	linc-im:6904866_2	2.92963897	0.002	0.014	0.984Coding
263	XLOC_010106	linc-loc797436_1	3.0616151	0	0.358	0.642Coding
264	XLOC_010005	linc-trpc1_1	3.107419	0	0.022	0.978Coding
265	XLOC_010452	linc-zgc:172183_1	3.2881183	0.22	0.362	0.418Coding
266	XLOC_010759	linc-zgc:162634_1	3.293935	0.018	0.124	0.858Coding
267	XLOC_002955	linc-loc556339_1	3.5751882	0.002	0.024	0.974Coding
268	XLOC_005166	linc-rps6ka1_1	3.623965346	0.298	0.118	0.584Coding
269	XLOC_013133	linc-zgc:100930_1	3.719213	0	0.02	0.98Coding
270	XLOC_014499	linc-zgc:194252_1	3.7603304	0.064	0.122	0.814Coding
271	XLOC_013000	linc-zgc:162952_1	3.7883439	0.034	0.132	0.834Coding
272	XLOC_015825	linc-si:ch73-250a16.3_1	3.9810773	0.122	0.034	0.844Coding
273	XLOC_008485	linc-zgc:91985_1	4.11772424	0.01	0.256	0.734Coding
274	XLOC_010255	linc-cullb_1	4.219307	0.018	0.232	0.75Coding
275	XLOC_004645	linc-efhb_1	4.2470647	0.002	0.208	0.79Coding
276	XLOC_009476	linc-adey6_(1_of_2)_1	4.2742664	0.022	0.336	0.642Coding
277	XLOC_007849	linc-ipol3_1	4.46053402	0.054	0.326	0.62Coding
278	XLOC_007557	linc-wu:fa18f11_1	4.498509	0	0.13	0.87Coding
279	XLOC_012498	linc-thy1_1	4.674566	0.08	0.042	0.878Coding
280	XLOC_004139	linc-fkrp_2	4.774505	0	0.002	0.998Coding
281	XLOC_012808	linc-zgc:73070_2_1	4.977169	0.12	0.184	0.696Coding
282	XLOC_014065	linc-ecsit_1	4.990663	0	0	1Coding
283	XLOC_012931	linc-zgc:158409_1	5.048879	0.236	0.222	0.542Coding
284	XLOC_005333	linc-loc566404_1	5.1341619	0.004	0.066	0.93Coding
285	XLOC_013682	linc-ptprf_1	5.2182169	0.04	0.074	0.886Coding
286	XLOC_015589	linc-si:dkey-7j20.1_1	5.3715667	0	0.012	0.988Coding
287	XLOC_005141	linc-rpl13a_3	5.539431	0.018	0.452	0.53Coding
288	XLOC_002869	linc-c6orf105_1	5.5555046	0.22	0.146	0.634Coding
289	XLOC_009215	linc-loc100334801_1	5.5994916	0.014	0.174	0.812Coding
290	XLOC_005101	linc-ecd_1	5.90139788	0.01	0.44	0.55Coding
291	XLOC_002573	linc-loc100149344_1	5.907448	0.084	0.03	0.886Coding
292	XLOC_014085	linc-wu:fi38e01_1	6.042249	0.002	0.042	0.956Coding
293	XLOC_010020	linc-ankha_1	6.11170731	0	0.052	0.948Coding
294	XLOC_013628	linc-gnai2_3	6.358318	0	0.064	0.936Coding
295	XLOC_004769	linc-crabb2a_2	6.5538937	0	0	1Coding
296	XLOC_004288	linc-zgc:153310_1	6.5650248	0	0.014	0.986Coding
297	XLOC_004612	linc-slc4a7_1	6.6407894	0	0.458	0.542Coding
298	XLOC_003608	linc-aldob_1	6.8946931	0	0.002	0.998Coding
299	XLOC_002774	linc-slc24a3_1	7.035924	0.01	0.024	0.966Coding
300	XLOC_001368	linc-loxl2a_1	7.11943686	0.106	0.108	0.786Coding
301	XLOC_000419	linc-anp32b_1	7.442346	0.106	0.026	0.868Coding
302	XLOC_010502	linc-fa2h_1	7.56618303	0.056	0.058	0.886Coding
303	XLOC_009439	linc-im:7141335_1	7.588955	0.034	0.152	0.814Coding
304	XLOC_012429	linc-plp1b_2	7.929681	0	0	1Coding
305	XLOC_004055	linc-zgc:110692_1	8.097765	0	0.116	0.884Coding
306	XLOC_004791	linc-chn2_1	8.1138016	0.284	0.138	0.578Coding
307	XLOC_012770	linc-np_001161936.1_1	8.3155996	0	0.02	0.98Coding
308	XLOC_013619	linc-eif6_3	8.514001	0.002	0.254	0.744Coding
309	XLOC_004430	linc-loc793249_1	8.539327	0.13	0.04	0.83Coding
310	XLOC_004974	linc-zgc:100811_1	8.930291	0.004	0.014	0.982Coding
311	XLOC_012299	linc-zgc:92791_1	9.98208	0.006	0.016	0.978Coding

312	XLOC_005030	linc-plcb2_1	10.06508774	0.014	0.454	0.532Coding
313	XLOC_004684	linc-zgc:76869_1	10.216932	0.024	0.01	0.966Coding
314	XLOC_015671	linc-zgc:162396_1	10.411151	0.134	0.384	0.482Coding
315	XLOC_004312	linc-ftr76_1	11.241148	0	0.012	0.988Coding
316	XLOC_013145	linc-loc794173_1	11.411461	0	0.104	0.896Coding
317	XLOC_011887	linc-zgc:101896_1	12.420488	0	0	1Coding
318	XLOC_008691	linc-lmbrd2b_1	12.564628	0	0	1Coding
319	XLOC_005611	linc-zgc:112052_1	12.625688	0	0	1Coding
320	XLOC_012302	linc-zgc:162948_1	12.935145	0	0.012	0.988Coding
321	XLOC_004137	linc-fkrp_1	13.01258	0	0	1Coding
322	XLOC_005836	linc-si:dkey-81n9.1_1	13.202504	0.134	0.24	0.626Coding
323	XLOC_011035	linc-copz2_1	15.140146	0.002	0.126	0.872Coding
324	XLOC_002512	linc-tmem106a_1	15.758029	0.018	0.24	0.742Coding
325	XLOC_010952	linc-zgc:77060_1	15.763576	0	0	1Coding
326	XLOC_008276	linc-zgc:171220_2	15.868308	0	0.032	0.968Coding
327	XLOC_013793	linc-cep63_1	15.88324989	0	0.002	0.998Coding
328	XLOC_009694	linc-wu:fc32f04_1	16.254292	0	0	1Coding
329	XLOC_010363	linc-pus3_1	17.190638	0	0	1Coding
330	XLOC_007445	linc-card8_(1_of_2)_1	17.2909484	0	0.048	0.952Coding
331	XLOC_012702	linc-nup88_1	17.612015	0.036	0.018	0.946Coding
332	XLOC_007380	linc-pex19_1	17.666878	0	0.01	0.99Coding
333	XLOC_014845	linc-pim1_1	18.2586166	0.01	0.464	0.526Coding
334	XLOC_004963	linc-gapdhs_1	18.588045	0	0.004	0.996Coding
335	XLOC_011555	linc-rogdi_1	19.046163	0.004	0.018	0.978Coding
336	XLOC_004721	linc-nt5c3_1	19.724305	0	0.002	0.998Coding
337	XLOC_009198	linc-si:rp71-36a1.3_1	21.163223	0	0	1Coding
338	XLOC_009735	linc-smpd2_1	21.948403	0	0	1Coding
339	XLOC_009183	linc-fbn2b_1	22.3075521	0.028	0.464	0.508Coding
340	XLOC_013498	linc-efcab7_1	22.772261	0	0.056	0.944Coding
341	XLOC_009865	linc-tardbpl_1	22.8476847	0	0.038	0.962Coding
342	XLOC_014450	linc-zgc:112305_1	23.44648374	0.4	0.04	0.56Coding
343	XLOC_006602	linc-ppp1r11_1	28.245812	0.096	0.058	0.846Coding
344	XLOC_010870	linc-q566t3_danre_1	29.40319	0.02	0.092	0.888Coding
345	XLOC_004947	linc-wu:fb12e11_1	29.5230336	0	0	1Coding
346	XLOC_010586	linc-a0jmg7_danre_2	29.5363284	0.002	0.16	0.838Coding
347	XLOC_004489	linc-zgc:175096_1	29.59002	0	0	1Coding
348	XLOC_005418	linc-spdya_1	31.28339	0	0.004	0.996Coding
349	XLOC_008320	linc-grin1a_1	31.5409886	0	0	1Coding
350	XLOC_002285	linc-loc100148088_1	31.556168	0.102	0.102	0.796Coding
351	XLOC_009436	linc-srsf6a_1	32.110646	0	0.018	0.982Coding
352	XLOC_010677	linc-fth1b_1	32.47451	0	0.062	0.938Coding
353	XLOC_004691	linc-adamtsl4_1	34.68897	0	0.004	0.996Coding
354	XLOC_012003	linc-msgn1_1	37.90861	0.002	0.032	0.966Coding
355	XLOC_006751	linc-loc799904_1	38.6036092	0	0	1Coding
356	XLOC_003831	linc-sirt2_1	40.89036	0	0	1Coding
357	XLOC_012907	linc-slc6a4b_1	42.707195	0.234	0.108	0.658Coding
358	XLOC_004620	linc-zfpm2a_6	43.28835	0	0	1Coding
359	XLOC_010043	linc-loc560369_1	43.648879	0.024	0.028	0.948Coding
360	XLOC_003564	linc-tmem129_1	45.187472	0	0	1Coding
361	XLOC_009497	linc-pnpla8_(2_of_2)_1	47.61853	0	0.006	0.994Coding
362	XLOC_009131	linc-psmd1_1	48.7608	0	0.002	0.998Coding
363	XLOC_006552	linc-sb:cb649_1	49.641362	0	0.184	0.816Coding
364	XLOC_011369	linc-zgc:66474_1	51.0958	0	0	1Coding
365	XLOC_009506	linc-pard6b_1	52.80564	0	0	1Coding
366	XLOC_011304	linc-sreb2_1	53.99538	0	0	1Coding

367	XLOC_001453	linc-por_1	55.88511	0	0.002	0.998Coding
368	XLOC_005511	linc-ktn1_1	59.671847	0.018	0.014	0.968Coding
369	XLOC_004486	linc-try_1	60.66739	0	0	1Coding
370	XLOC_013354	linc-sec23b_1	60.93178	0.016	0.22	0.764Coding
371	XLOC_012587	linc-gc3_2_1	63.456301	0	0	1Coding
372	XLOC_001407	linc-zgc:110695_2	63.88561	0.006	0.408	0.586Coding
373	XLOC_006862	linc-xrn1_1	64.77411	0	0	1Coding
374	XLOC_013540	linc-zgc:77517_3	73.36502	0.01	0.04	0.95Coding
375	XLOC_009527	linc-her4.2_1	75.076073	0	0	1Coding
376	XLOC_009213	linc-loc100334996_1	80.89063	0.088	0.018	0.894Coding
377	XLOC_014976	linc-suv39h1b_1	81.62687	0	0.1	0.9Coding
378	XLOC_000874	linc-agpat3_1	83.9615377	0.28	0.056	0.664Coding
379	XLOC_003606	linc-q7syn2_danre_1	85.4230492	0	0	1Coding
380	XLOC_012737	linc-gsnb_1	86.04136	0	0	1Coding
381	XLOC_013590	linc-im:7160159_1	89.174034	0	0	1Coding
382	XLOC_003438	linc-zgc:171223_1	91.3504259	0	0.004	0.996Coding
383	XLOC_005830	linc-ugt5f1_1	95.8689351	0	0	1Coding
384	XLOC_005636	linc-tph2_1	96.50082	0	0.002	0.998Coding
385	XLOC_013210	linc-prpf4_1	96.66392	0	0	1Coding
386	XLOC_010961	linc-ccdc101_1	97.3931103	0	0.006	0.994Coding
387	XLOC_002063	linc-tk1_1	101.26672	0	0	1Coding
388	XLOC_008217	linc-ip013_2_1	102.6915	0	0	1Coding
389	XLOC_000642	linc-gart_1	103.11266	0	0	1Coding
390	XLOC_002504	linc-zgc:153947_1	104.8629	0	0.002	0.998Coding
391	XLOC_009999	linc-cyb5a_2	106.9893288	0	0	1Coding
392	XLOC_008381	linc-loc564655_1	109.04635	0	0	1Coding
393	XLOC_016008	linc-acp6_1	112.43539	0	0.002	0.998Coding
394	XLOC_011382	linc-rpl19_1	124.748987	0	0	1Coding
395	XLOC_004918	linc-zgc:77056_2	130.2511	0	0.004	0.996Coding
396	XLOC_003569	linc-zgc:172056_1	132.89883	0	0	1Coding
397	XLOC_014516	linc-wu:fi38e01_3_1	146.65259	0	0	1Coding
398	XLOC_015274	linc-si:ch211-150o23.3_1	147.14173	0	0	1Coding
399	XLOC_000399	linc-loc557812_1	154.729127	0	0.012	0.988Coding
400	XLOC_011739	linc-foxp2_2_1	155.12436	0.004	0.002	0.994Coding
401	XLOC_012486	linc-vamp8_2	162.57052	0.022	0.232	0.746Coding
402	XLOC_015912	linc-gtf2f2b_1	180.276774	0.05	0.234	0.716Coding
403	XLOC_005086	linc-zgc:158367_1	189.59781	0	0	1Coding
404	XLOC_004043	linc-zgc:77147_1	201.9026	0.134	0.168	0.698Coding
405	XLOC_005417	linc-loc559575_1	213.53447	0	0	1Coding
406	XLOC_014836	linc-mcp2_1	218.719507	0	0	1Coding
407	XLOC_014093	linc-mettl3_1	221.2762866	0.024	0.01	0.966Coding
408	XLOC_006795	linc-dlg11_1	232.6671	0	0	1Coding
409	XLOC_009619	linc-fbxo25_2	235.72162	0	0	1Coding
410	XLOC_008477	linc-cd74_1	244.4372	0	0	1Coding
411	XLOC_012147	linc-si:dkeyp-38g8.5_1	260.98263	0	0.002	0.998Coding
412	XLOC_014507	linc-loc563681_1	263.4642	0	0	1Coding
413	XLOC_009904	linc-bin2a_1	268.72789	0.096	0.062	0.842Coding
414	XLOC_014525	linc-cldn7a_1	293.82669	0	0.01	0.99Coding
415	XLOC_002429	linc-zgc:152954_1	294.4391916	0	0	1Coding
416	XLOC_012971	linc-zgc:112985_1	294.81448	0	0	1Coding
417	XLOC_009422	linc-zgc:113423_1	324.41439	0	0	1Coding
418	XLOC_011453	linc-zgc:153240_1	326.6791	0	0.002	0.998Coding
419	XLOC_015548	linc-loc100334485_1	355.254066	0	0	1Coding
420	XLOC_010132	linc-ca2_1	382.2282	0	0	1Coding
421	XLOC_003435	linc-csnk1a1_2	409.820252	0	0	1Coding

422	XLOC_000733	linc-tmem192_1	447.1629167	0	0.018	0.982Coding
423	XLOC_003762	linc-a2ruy8_danre_1	455.9918	0	0	1Coding
424	XLOC_012738	linc-rab14_2	459.63011	0	0	1Coding
425	XLOC_011257	linc-zgc:165627_1	509.77857	0.018	0.358	0.624Coding
426	XLOC_007863	linc-mpp5b_1	529.64278	0	0	1Coding
427	XLOC_012685	linc-pisd_2	537.95144	0.028	0.062	0.91Coding
428	XLOC_004595	linc-trmt11_2	653.14126	0	0	1Coding
429	XLOC_015720	linc-grtp1b_1	657.7823	0	0	1Coding
430	XLOC_012816	linc-vkorc111_2	1209.3079	0.006	0.052	0.942Coding
431	XLOC_011509	linc-prl_1	1481.4208	0	0	1Coding
432	XLOC_012280	linc-loc100332930_1	1586.181162	0	0	1Coding
433	XLOC_008456	linc-otub11_1	2015.3379	0	0	1Coding
434	XLOC_001232	linc-mipep1_1	4004.8405	0.07	0.07	0.86Coding
435	XLOC_004118	linc-wrb_1	4232.682	0.068	0.046	0.886Coding

**Table S4. TOC predictions for lncRNAs from Guttman et al., 2011**

TOC was used to classify proposed zebrafish lncRNAs from Guttman et al., 2011. Listed are the name of the locus (XLOC\_xxx), the transcript identifier and the RNA-Seq based expression level in fragments per kilobase of exon per million fragments mapped (FPKM). For the most coding-like ORF (for predicted coding transcripts) or leader-like ORF (for predicted leader-like or trailer-like transcripts) within a transcript, the list shows the relative frequency of trees that classify that ORF as trailer, leader or coding. Note that this ORF may not necessarily be the longest or the most RPF-dense ORF within the locus. The last column contains the resulting TOC-based classification for the particular transcript. Transcript structures with all associated metadata (chromosome start/end, strand, locus name, isoform name, exon-intron structure) are accessible as GTF files at Gene Expression Omnibus (GEO) (accession number GSE46512).

	Locus	Transcript	FPKM	Trailer	Leader	Coding	Prediction
1	XLOC_006913	linc1477.2_1	1.00919	0.526	0.472	0.002	Trailer-like
2	XLOC_004933	linc1274.2_1_2	1.086	0.724	0.272	0.004	Trailer-like
3	XLOC_020832	linc1390.2_1	1.16471	1	0	0	Trailer-like
4	XLOC_007846	linc1610.2_1	1.21595	0.654	0.34	0.006	Trailer-like
5	XLOC_004185	linc1453.2_1	1.26173	1	0	0	Trailer-like
6	XLOC_021035	linc1399.2_1_2	1.31879	0.584	0.416	0	Trailer-like
7	XLOC_001932	linc1244.2_1	1.41468	0.688	0.312	0	Trailer-like
8	XLOC_005788	linc1284.2_1	1.41661	0.682	0.318	0	Trailer-like
9	XLOC_005330	linc1470.2_1	1.49727	0.59	0.388	0.022	Trailer-like
10	XLOC_002471	linc1599.2_1	1.64832	0.596	0.404	0	Trailer-like
11	XLOC_006614	linc1607.2_1	1.7777	0.664	0.336	0	Trailer-like
12	XLOC_021168	linc1401.2_1	2.01592	0.564	0.436	0	Trailer-like
13	XLOC_016788	linc1629.2_1_2	2.14976	0.876	0.124	0	Trailer-like
14	XLOC_009895	linc1313.2_1	2.15483	0.954	0.046	0	Trailer-like
15	XLOC_016148	linc1625.2_1_2	2.21079	0.726	0.274	0	Trailer-like
16	XLOC_000341	linc1418.2_1	2.28963	0.688	0.312	0	Trailer-like
17	XLOC_004750	linc1270.2_1_2	2.54777	0.712	0.288	0	Trailer-like
18	XLOC_003000	linc1449.2_1	2.65834	0.82	0.18	0	Trailer-like
19	XLOC_009028	linc1306.2_1	2.67207	0.992	0.008	0	Trailer-like
20	XLOC_019525	linc1631.2_1	2.79886	0.902	0.098	0	Trailer-like
21	XLOC_017706	linc1369.2_1	3.0481	0.684	0.316	0	Trailer-like
22	XLOC_003730	linc1262.2_1	3.87627	0.548	0.444	0.008	Trailer-like
23	XLOC_013660	linc1335.2_2	4.48857	0.612	0.388	0	Trailer-like
24	XLOC_019501	linc1385.2_1	4.63649	0.706	0.294	0	Trailer-like
25	XLOC_020636	linc1587.2_1_2	4.98752	1	0	0	Trailer-like
26	XLOC_017027	linc1552.2_1	6.3737	0.882	0.118	0	Trailer-like
27	XLOC_002054	linc1246.2_2	6.96284	0.898	0.102	0	Trailer-like
28	XLOC_019944	linc1388.2_1	8.41961	0.796	0.194	0.01	Trailer-like
29	XLOC_011410	linc1510.2_1	11.4172	0.824	0.176	0	Trailer-like
30	XLOC_010491	linc1317.2_1_2	12.5055	0.694	0.306	0	Trailer-like
31	XLOC_004501	linc1458.2_4	12.5275	1	0	0	Trailer-like
32	XLOC_003273	linc1256.2_1	14.4789	0.954	0.046	0	Trailer-like
33	XLOC_023248	linc1410.2_1	1.01226	0.004	0.996	0	Leader-like
34	XLOC_008854	linc1494.2_1	1.02667	0.002	0.998	0	Leader-like
35	XLOC_005373	linc1471.2_1	1.03988	0.01	0.99	0	Leader-like

36	XLOC_004265	linc1454.2_1	1.04719	0.122	0.878	0Leader-like
37	XLOC_020467	linc1398.2_1	1.05052	0.106	0.894	0Leader-like
38	XLOC_009483	linc1311.2_1	1.07007	0.138	0.86	0.002Leader-like
39	XLOC_007104	linc1482.2_1	1.08783	0.268	0.732	0Leader-like
40	XLOC_023393	linc1411.2_1	1.13019	0.018	0.982	0Leader-like
41	XLOC_018518	linc1572.2_1	1.13166	0.39	0.61	0Leader-like
42	XLOC_003533	linc1261.2_1_2	1.13801	0.004	0.996	0Leader-like
43	XLOC_008976	linc1304.2_1	1.22201	0.142	0.858	0Leader-like
44	XLOC_009462	linc1310.2_1	1.23691	0.278	0.722	0Leader-like
45	XLOC_002995	linc1603.2_1	1.24501	0	1	0Leader-like
46	XLOC_022651	linc1592.2_1	1.24775	0.37	0.63	0Leader-like
47	XLOC_021110	linc1400.2_1	1.25078	0.078	0.922	0Leader-like
48	XLOC_020556	linc1634.2_1	1.288	0.026	0.974	0Leader-like
49	XLOC_000789	linc1231.2_1	1.30058	0.018	0.982	0Leader-like
50	XLOC_017142	linc1555.2_1	1.30796	0.154	0.842	0.004Leader-like
51	XLOC_008097	linc1300.2_1	1.32481	0	1	0Leader-like
52	XLOC_015768	linc1626.2_1	1.36507	0.008	0.99	0.002Leader-like
53	XLOC_000393	linc1595.2_1	1.36518	0.02	0.98	0Leader-like
54	XLOC_010963	linc1505.2_1	1.38277	0.05	0.95	0Leader-like
55	XLOC_000630	linc1428.2_1	1.38726	0.32	0.68	0Leader-like
56	XLOC_000718	linc1230.2_1	1.44403	0.344	0.656	0Leader-like
57	XLOC_017299	linc1630.2_1	1.45104	0.394	0.606	0Leader-like
58	XLOC_003485	linc1600.2_1	1.46676	0.052	0.948	0Leader-like
59	XLOC_001701	linc1596.2_1	1.50535	0.114	0.886	0Leader-like
60	XLOC_011749	linc1515.2_1	1.58538	0.036	0.964	0Leader-like
61	XLOC_014929	linc1623.2_1	1.60846	0.15	0.85	0Leader-like
62	XLOC_001704	linc1439.2_1	1.72639	0	1	0Leader-like
63	XLOC_010390	linc1503.2_1	1.75503	0.338	0.662	0Leader-like
64	XLOC_016957	linc1549.2_1	1.75964	0.03	0.97	0Leader-like
65	XLOC_009903	linc1615.2_1	1.77133	0.002	0.998	0Leader-like
66	XLOC_012162	linc1618.2_1	1.79431	0.014	0.986	0Leader-like
67	XLOC_011861	linc1319.2_1_2	1.79802	0.002	0.998	0Leader-like
68	XLOC_003441	linc1260.2_1	1.79876	0.008	0.992	0Leader-like
69	XLOC_010259	linc1616.2_1	1.84597	0	1	0Leader-like
70	XLOC_022293	linc1635.2_1	1.86268	0	1	0Leader-like
71	XLOC_015785	linc1627.2_1	1.86814	0	1	0Leader-like
72	XLOC_001794	linc1597.2_1	1.91422	0.002	0.998	0Leader-like
73	XLOC_011172	linc1507.2_1	1.92403	0.028	0.972	0Leader-like
74	XLOC_012766	linc1331.2_3	1.94604	0	1	0Leader-like
75	XLOC_006823	linc1608.2_1_2	2.10662	0.002	0.998	0Leader-like
76	XLOC_022490	linc1405.2_1	2.22561	0	1	0Leader-like
77	XLOC_003384	linc1259.2_3_4	2.26626	0.016	0.984	0Leader-like
78	XLOC_017631	linc1366.2_1	2.34296	0	1	0Leader-like
79	XLOC_013461	linc1334.2_1_2	2.36031	0.014	0.986	0Leader-like
80	XLOC_007138	linc1289.2_2	2.41709	0.046	0.954	0Leader-like
81	XLOC_004340	linc1456.2_1	2.43278	0.036	0.964	0Leader-like
82	XLOC_005747	linc1282.2_1	2.44136	0.004	0.996	0Leader-like
83	XLOC_010005	linc1316.2_1_2	2.49515	0.132	0.868	0Leader-like
84	XLOC_015532	linc1535.2_1_2	2.50887	0.162	0.838	0Leader-like
85	XLOC_016715	linc1359.2_1_2	2.57772	0.018	0.982	0Leader-like
86	XLOC_015568	linc1536.2_1	2.71953	0	1	0Leader-like
87	XLOC_021030	linc2097.2_1	2.77197	0.014	0.986	0Leader-like
88	XLOC_003968	linc1604.2_1_2	2.77267	0	1	0Leader-like
89	XLOC_007429	linc1293.2_1	2.8702	0.18	0.82	0Leader-like
90	XLOC_016634	linc1628.2_1	2.94248	0.376	0.624	0Leader-like

91	XLOC_002698	linc1601.2_1	2.98221	0	1	0Leader-like
92	XLOC_007948	linc1487.2_1	3.00082	0	1	0Leader-like
93	XLOC_003349	linc1258.2_1	3.00971	0.004	0.996	0Leader-like
94	XLOC_006663	linc1288.2_1	3.11753	0.202	0.798	0Leader-like
95	XLOC_017210	linc1557.2_1	3.14584	0.018	0.982	0Leader-like
96	XLOC_002239	linc1253.2_1_2	3.17477	0.062	0.938	0Leader-like
97	XLOC_002193	linc1251.2_1	3.25195	0.026	0.974	0Leader-like
98	XLOC_013858	linc1621.2_1_2	3.26227	0.014	0.986	0Leader-like
99	XLOC_006861	linc1476.2_1	3.32421	0.102	0.898	0Leader-like
100	XLOC_002029	linc1245.2_2	3.37576	0.394	0.606	0Leader-like
101	XLOC_008923	linc1303.2_1_2	3.41967	0	1	0Leader-like
102	XLOC_015323	linc1346.2_1	3.46539	0.166	0.834	0Leader-like
103	XLOC_021554	linc1588.2_1	3.59485	0	1	0Leader-like
104	XLOC_015913	linc1543.2_1	3.6301	0	1	0Leader-like
105	XLOC_008124	linc1609.2_1	3.92998	0.114	0.886	0Leader-like
106	XLOC_009164	linc1613.2_2	3.93304	0	1	0Leader-like
107	XLOC_003024	linc1450.2_1	4.16476	0	1	0Leader-like
108	XLOC_014484	linc1624.2_1	4.39066	0.204	0.796	0Leader-like
109	XLOC_005726	linc1281.2_1	4.44797	0	1	0Leader-like
110	XLOC_011113	linc1617.2_1	4.59842	0.036	0.964	0Leader-like
111	XLOC_017260	linc1560.2_1	5.0251	0.23	0.768	0.002Leader-like
112	XLOC_000423	linc1423.2_1_2	5.2054	0.042	0.958	0Leader-like
113	XLOC_000422	linc1422.2_93_94_95	5.34378	0	1	0Leader-like
114	XLOC_020458	linc1582.2_1_2	5.40348	0.012	0.988	0Leader-like
115	XLOC_004203	linc1605.2_1	5.5395	0	1	0Leader-like
116	XLOC_023435	linc1412.2_2	5.55574	0	1	0Leader-like
117	XLOC_012670	linc1328.2_1	5.61459	0	1	0Leader-like
118	XLOC_002974	linc1448.2_1	5.70687	0.124	0.868	0.008Leader-like
119	XLOC_015582	linc1537.2_1	5.76334	0.216	0.784	0Leader-like
120	XLOC_004958	linc1460.2_2	5.96509	0.016	0.984	0Leader-like
121	XLOC_023498	linc1413.2_3_4	6.10064	0.002	0.998	0Leader-like
122	XLOC_017223	linc1558.2_2	6.23719	0.016	0.984	0Leader-like
123	XLOC_019989	linc1389.2_1_2	6.27955	0.006	0.994	0Leader-like
124	XLOC_007489	linc1294.2_1	6.63289	0.138	0.862	0Leader-like
125	XLOC_007720	linc1484.2_1	6.73035	0	1	0Leader-like
126	XLOC_016334	linc1354.2_1	7.26459	0.004	0.996	0Leader-like
127	XLOC_023180	linc1408.2_1_2	7.34816	0.012	0.988	0Leader-like
128	XLOC_011521	linc1511.2_1_2	7.59538	0	1	0Leader-like
129	XLOC_015405	linc1533.2_1	7.60122	0.012	0.988	0Leader-like
130	XLOC_013460	linc1333.2_1	8.33002	0.01	0.99	0Leader-like
131	XLOC_007934	linc1611.2_1	8.92259	0.104	0.896	0Leader-like
132	XLOC_009710	linc1315.2_1	9.23914	0.002	0.998	0Leader-like
133	XLOC_012658	linc1619.2_1	10.5673	0	1	0Leader-like
134	XLOC_005787	linc1283.2_1_1	11.7221	0.398	0.602	0Leader-like
135	XLOC_023098	linc1406.2_1	13.5835	0	1	0Leader-like
136	XLOC_015583	linc1538.2_1	14.276	0.002	0.998	0Leader-like
137	XLOC_012755	linc1620.2_1	15.0508	0	1	0Leader-like
138	XLOC_003311	linc1257.2_1	15.1276	0.04	0.96	0Leader-like
139	XLOC_017356	linc1359.2_3_4	15.6068	0.008	0.992	0Leader-like
140	XLOC_003211	linc1451.2_1	15.7753	0	1	0Leader-like
141	XLOC_012675	linc1329.2_2	16.2993	0	1	0Leader-like
142	XLOC_016896	linc1547.2_1	16.4443	0.152	0.848	0Leader-like
143	XLOC_009568	linc1614.2_1	17.687	0.012	0.988	0Leader-like
144	XLOC_001657	linc1435.2_1	23.4318	0.108	0.892	0Leader-like
145	XLOC_016784	linc1545.2_1	34.7786	0.002	0.998	0Leader-like

146	XLOC_005325	linc2096.2_4	34.9166	0	1	0Leader-like
147	XLOC_002238	linc1252.2_1	38.2363	0.48	0.52	0Leader-like
148	XLOC_011335	linc1509.2_2_3	52.868	0.326	0.674	0Leader-like
149	XLOC_000476	linc1425.2_1_2	93.1264	0.002	0.998	0Leader-like
150	XLOC_020295	linc1391.2_2_3	183.261	0.002	0.998	0Leader-like
151	XLOC_009192	linc1307.2_2	424.394	0.004	0.996	0Leader-like
152	XLOC_005245	linc1465.2_1_2	1.29714	0.026	0.052	0.922Coding
153	XLOC_020904	linc1394.2_1	1.3171	0	0.002	0.998Coding
154	XLOC_014819	linc1622.2_1	1.89226	0.034	0.056	0.91Coding
155	XLOC_018235	linc1563.2_1	2.06221	0	0.002	0.998Coding
156	XLOC_015693	linc1540.2_1	2.14081	0	0.002	0.998Coding
157	XLOC_018322	linc1565.2_1	2.29785	0.002	0.004	0.994Coding
158	XLOC_005221	linc1463.2_1	3.54802	0.012	0.436	0.552Coding
159	XLOC_001648	linc1434.2_1	3.67314	0	0	1Coding
160	XLOC_008722	linc1493.2_1	4.40672	0.01	0.484	0.506Coding
161	XLOC_019546	linc1386.2_1	7.02877	0.056	0.042	0.902Coding
162	XLOC_019254	linc1379.2_13	7.51859	0	0.004	0.996Coding
163	XLOC_018329	linc1566.2_1	8.03656	0	0.056	0.944Coding
164	XLOC_019376	linc1382.2_1	9.94269	0	0.028	0.972Coding
165	XLOC_023228	linc1409.2_15	12.3964	0	0	1Coding
166	XLOC_020896	linc1393.2_1	65.6662	0.052	0.284	0.664Coding
167	XLOC_015133	linc1343.2_2	329.966	0.014	0.136	0.85Coding