



September 17, 2008 – Novel Small RNAs Discovered, Contribute to Significant miRBase Update.

Non-coding (ncRNAs) are a large class of RNAs which do not encode proteins but possess regulatory functions at the level of translation in cells of various species. There are an increasing amount of data suggesting that there are likely many more ncRNAs that exist, yet to be discovered. Custom small RNA discovery microarrays have been shown to be an effective approach for uncovering novel ncRNAs experimentally¹ and/or to validate predicted candidate ncRNAs².

Recently, researchers at Baylor College of Medicine employed a discovery strategy of computational prediction and microarray expression profiling to uncover a large number of novel small RNAs in embryonic stem (ES) cells³. Dr. Preethi Gunaratne and co-workers reported using computation, custom small RNA microarray from LC Sciences, and validation experiments to uncover hundreds of novel small RNAs in ES cells. These small non-coding RNAs (ncRNAs) were from adult tissue progenitor transcript sequences and are micro-conserved elements. The detection probes were designed for custom array synthesis by LC Sciences, Houston, TX (www.lcsciences.com) and included the standard microRNA (miRNA) sequences in miRBase⁴, a comprehensive panel of 2,617 micro-conserved ncRNA sequences, and several hundreds of literature reported small RNAs or miRNAs. Two generations of custom array designs were used for optimizing the probes. These profiling studies using ES cell lines as well as normal adult mouse tissues identified 545 small RNAs that are enriched in ES cells over adult cells. Of these, more than 100 exhibited down-regulation in ES gene-knockout cells typical of miRNA.

In a similar way, LC Sciences' custom small RNA arrays have provided means for validation of computational predictions of *Bombyx mori* (silkworm)⁵ and *Solanum lycopersicum* (Tomato)⁶ miRNAs. These are species whose genomes are incomplete at the present time. It is well known that miRNAs are important players for regulation of cellular activities. Therefore, the establishment of miRNAs in these traditional industrial or agricultural important species should lead to better understanding of the fundamentals of their growth, maturation, and disease-resistance.

The small RNA discoveries were made possible, in part, by LC Sciences' small RNA discovery service. Using an innovative μ Paraflo[®] platform technology and proprietary probe design, it enables highly sensitive and specific direct detection of small RNAs in your sample. This service is comprehensive; from array design to sample to complete data set, allowing efficient and reliable discovery of novel miRNA and other types of ncRNAs.

The new *Bombyx* and *Solanum* sequences were included as part of the latest update to the miRBase sequence database of experimentally verified miRNAs. The Sanger Institute released the latest version (12.0) of miRBase on September 1st. (<http://microrna.sanger.ac.uk/sequences/>) The number of verified miRNAs has been increased from 6396 to 8619 hairpin precursor

miRNAs expressing 8273 mature miRNA products. With the addition of 2062 new mature miRNA sequences, this represents the largest update in miRBase history.

Many sequences have been updated or revised. For the first time, miRNAs are reported from: eleven new *Drosophila* species, Platypus, Tomato, Red Flour Beetle, and two Polyomaviruses. There has been a significant increase in the number of miRNAs reported for Human and model species such as Chimpanzee, Mouse, and *Arabidopsis* as well as agriculturally important species such as Rice, Soybean, Pig, and Chicken.

The updated probe content from miRBase version 12.0 is currently available on all of our standard or custom small RNA microarrays.

More information about LC Sciences' Small Non-coding RNA Discovery Service and the μ Paraflo[®] technology is available at: http://www.lcsciences.com/small_non_coding.html.

About LC Sciences - LC Sciences is a genomics and proteomics products company offering a comprehensive line of DNA, RNA, and peptide microarrays for nucleic acid/protein profiling and functional analysis, biomarker-discovery, novel drug screening, and the custom development of miniaturized assay devices for diagnostics and biosensing applications. Based on the μ Paraflo[®] microfluidics technology, LC Sciences' innovative products offer significant flexibility and customization capability for rapidly evolving, diverse customer needs. In an era of rapid technological advancement, LC Sciences offers service products which enable efficient one-stop solution for assays of DNA, RNA, protein, enzymes, antibodies, or small molecules. LC Sciences also provides unique synthetic DNA and RNA products such as OligoMix[®], generated using their microfluidic biochip synthesizer. These innovative products drive synthetic biology and systems biology applications by reducing the cost and increasing the speed of highly multiplexing large-scale nucleic acid and protein engineering experiments.

More information about LC Sciences is available at www.lcsciences.com.

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