



PBL AWARDED TWO FURTHER US PATENTS ON RNAi: [US 8,258,285](#) & [US 8,263,569](#)

Plant Bioscience Limited (PBL) is pleased to announce that the United States Patent and Trademark Office (USPTO) has issued out US Patent No. 8,258,285 with fundamental claims directed to compositions to effect gene silencing and US Patent No. 8,263,569 with fundamental claims directed to methods of inducing gene silencing using short RNA molecules, or DNA constructs encoding short RNA molecules, in a wide range of organisms, including in plants and humans.

Silencing is a natural mechanism for down-regulating gene expression that is found in most complex organisms and it is the focus of tremendous activity in the life science industry. It has been widely exploited in research for gene discovery, and for characterisation of gene function. It holds great promise as a therapeutic tool, and currently “gene therapy” applications are being developed for ailments as diverse as cancer, viral diseases and obesity. The technology is also referred to as “RNAi”, short for RNA interference.

The award of these new patents (US Patent No. [8,258,285](#), issued 4 September 2012 & US Patent No. [8,263,569](#), issued 11 September 2012) builds on and extends the scope of claims, following the grant of US Patent No. [8,097,710](#) on 17 January 2012. These patents come as further recognition of the pioneering contributions of Professor Sir David Baulcombe and Dr Andrew Hamilton to the field of silencing. The original patent application based on this work was filed by PBL in 1999, following Baulcombe and Hamilton’s ground-breaking research at The Sainsbury Laboratory in Norwich, UK and published in Science (“[A Species of Small Antisense RNA in Posttranscriptional Gene Silencing in Plants](#)”, (1999), 286, pp. 950-952). This paper provided the first identification that short RNA molecules are the active agents of silencing, and the patent describes methods and compositions for use of such molecules for inducing silencing in living organisms.

These new patents extend the previously allowed method claims into longer RNAi molecules of 20 to 30 nucleotides (US Patent No. 8,263,569) and now also include compositions for achieving silencing by the use of RNAi (US Patent No. 8,258,285). Therefore the scope of this invention has been significantly broadened to cover a wide range of applications in use in the pharmaceutical, biotechnology and agricultural biotechnology industries. Research methods and reagents, as well as diagnostic tools and kits are also encompassed.

PBL’s Managing Director, Dr Jan Chojecki, states “We are very pleased that our efforts in working with the US Patent Office have resulted in issuance of these new patents. These new claims extend coverage of our patent rights into more applications that are widely used throughout the life science industry, covering R&D uses, kits and reagents, as well as commercial products. We have already announced our partnership with Alnylam ([Press Release 23 May 2012](#)), we have concluded licenses with major companies in the crop biotech sector, and have other licensing discussions on-going. We look forward to extending our partnerships for this important technology, across all these various fields of use.”

The importance of silencing as a scientific discovery was underlined both by the award of a Nobel Prize in 2006 to Andrew Fire and Craig Mello, in recognition of their seminal publication in 1998 on the use of long dsRNA to induce silencing in nematodes, and the Lasker Foundation awarding the 2008 Albert Lasker Basic Research Award jointly to David Baulcombe (whose work demonstrated that short RNA molecules have a broad applicability as markers and inducers of gene silencing in living organisms), jointly with Gary Ruvkun and Victor Ambros (for their combined effort in identifying the first miRNA in nematodes). On issuing the award, the Lasker Foundation noted David Baulcombe’s contributions thus: “[For discoveries that revealed an unanticipated world of tiny RNAs that regulate gene function in plants and animals](#)”. In addition, in 2009, Professor Baulcombe was awarded a knighthood “[for services to Plant Science](#)”.

Please click [here](#) for a link to the Short RNA section on our website.

For licensing enquiries, please contact Dr Lars von Borcke (lars@pbltechnology.com).
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About PBL

Plant Bioscience Limited (PBL) www.pbltechnology.com is a technology development and intellectual property management company owned in equal parts by The Sainsbury Laboratory www.tsl.ac.uk, the John Innes Centre www.jic.ac.uk and the Biotechnology and Biological Sciences Research Council www.bbsrc.ac.uk. PBL promotes the development and commercial uptake of academic research results for public use and benefit and is specialised in life sciences, and in particular plant, food and microbial science.

PBL is the owner of the patent rights created by this work of Andrew Hamilton and David Baulcombe.

About The Sainsbury Laboratory

The Sainsbury Laboratory (TSL) www.tsl.ac.uk is a world-leading research centre located in Norwich, UK, focusing on making fundamental discoveries about plants and how they interact with microbes. [Professor Sir David Baulcombe](#) is now Regius Professor of Botany and Royal Society Research Professor at The University of Cambridge. [Dr Andrew Hamilton](#) is now at The University of Glasgow, in the Division of Cancer Sciences and Molecular Pathology.

Glossary:

siRNA	short interfering RNA
SRM	short RNA molecule
miRNA	MicroRNA
dsRNA	double stranded RNA
RNAi	RNA interference

US 8,258,285 CLAIMS:

1. A composition for introduction into a cell to effect gene silencing, consisting essentially of isolated short antisense RNA molecules (SARMs) and isolated short sense RNA molecules (SSRMs), collectively short RNA molecules (SRMs), wherein the SSRMs and SARMs are each of a uniform length of 20-24 nucleotides; wherein said SARMs are complementary to and can base pair with a target RNA, which target RNA is transcribed from a gene that is silenced when said SRMs are present in a cell containing said gene, and said SSRMs correspond to the target RNA; wherein said gene is endogenous to an organism selected from the group consisting of a plant, a mammal, an avian organism, a reptile, an insect, and a protozoan, or said target RNA is generated by a pathogen; and wherein if said SARMs and SSRMs consist of 20 nucleotides, said SARMs and SSRMs are unmodified.
2. The composition of claim 1 wherein said SRMs are of uniform length of 20 nucleotides.
3. An improved composition for introduction into a cell to effect gene silencing, which improved composition comprises isolated short antisense RNA molecules (SARMs) of a uniform length of 20-24 nucleotides; wherein said SARMs are complementary to and can base pair with a target RNA, and; the improvement comprising including in said composition isolated short sense RNA molecules (SSRMs) of a uniform length of 20-24 nucleotides, wherein said SSRMs correspond to said target RNA; wherein said target RNA is transcribed from a gene that is silenced when said SSRMs and SARMs are present in a cell containing said gene, wherein said gene is endogenous to an organism selected from the group consisting of a plant, a mammal, an avian organism, a reptile, an insect, and a protozoan; or said target RNA is generated by a pathogen; wherein if said SARMs and SSRMs consist of 20 nucleotides, said SARMs and SSRMs are unmodified.
4. The composition of claim 1 wherein said SRMs are of uniform length of 21 nucleotides.
5. The composition of claim 1 wherein said SRMs are of uniform length of 22 nucleotides.
6. The composition of claim 1 wherein said SRMs are of uniform length of 23 nucleotides.
7. The composition of claim 1 wherein said SRMs are of uniform length of 24 nucleotides.
8. The composition of claim 3 wherein the SSRMs and SARMs each consist of 20 nucleotides.
9. The composition of claim 3 wherein the SSRMs and SARMs each consist of 21 nucleotides.
10. The composition of claim 3 wherein the SSRMs and SARMs each consist of 22 nucleotides.
11. The composition of claim 3 wherein the SSRMs and SARMs each consist of 23 nucleotides.
12. The composition of claim 3 wherein the SSRMs and SARMs each consist of 24 nucleotides.
13. A composition for introduction into a cell to effect gene silencing, which composition comprises at least one vector which, when introduced into a cell, produces short antisense RNA molecules (SARMs) and short sense RNA molecules (SSRMs), said SARMs and SSRMs designated, collectively, short RNA molecules (SRMs), wherein the SSRMs and SARMs are each of a uniform length of 20-24 nucleotides; wherein said SARMs are complementary to and can base pair with a target RNA, which target RNA is transcribed from a gene that is silenced when said SRMs are present in a cell containing said gene, and said SSRMs correspond to the target RNA; wherein said gene is endogenous to an organism selected from the group consisting of a plant, a mammal, an avian organism, a reptile, an insect, and a protozoan, or said target RNA is generated by a pathogen.
14. The composition of claim 13 wherein said SRMs are of uniform length of 20 nucleotides.
15. The composition of claim 13 wherein said SRMs are of uniform length of 21 nucleotides.
16. The composition of claim 13 wherein said SRMs are of uniform length of 22 nucleotides.
17. The composition of claim 13 wherein said SRMs are of uniform length of 23 nucleotides.
18. The composition of claim 13 wherein said SRMs are of uniform length of 24 nucleotides.

19. An improved composition for introduction into a cell to effect gene silencing, which composition comprises at least one vector which, when introduced into a cell, produces short antisense RNA molecules (SARMs) of a uniform length of 20-24 nucleotides; wherein said SARMs are complementary to and can base pair with a target RNA; the improvement comprising including in said at least one vector sequences such that short sense RNA molecules (SSRMs) are also produced, wherein said SSRMs are of a uniform length of 20-24 nucleotides and said SSRMs correspond to the target RNA; which target RNA is transcribed from a gene that is silenced when said SARMs and SSRMs are present in a cell containing said gene, wherein said gene is endogenous to an organism selected from the group consisting of a plant, a mammal, an avian organism, a reptile, an insect, and a protozoan, or said target RNA is generated by a pathogen.
20. The composition of claim 19 wherein the SSRMs and SARMs each consist of 20 nucleotides.
21. The composition of claim 19 wherein the SSRMs and SARMs each consist of 21 nucleotides.
22. The composition of claim 19 wherein the SSRMs and SARMs each consist of 22 nucleotides.
23. The composition of claim 19 wherein the SSRMs and SARMs each consist of 23 nucleotides.
24. The composition of claim 19 wherein the SSRMs and SARMs each consist of 24 nucleotides.

US 8,263,569 CLAIMS:

1. A method of silencing a gene in cells which method comprises introducing into said cells a composition that consists essentially of isolated short antisense RNA molecules (SARMs) and isolated short sense RNA molecules (SSRMs), collectively short RNA molecules (SRMs), wherein the SSRMs and SARMs consist of 20-30 nucleotides; wherein said SARMs are complementary to, and can base pair with, a target RNA, which target RNA is transcribed from a gene that is silenced when said SRMs are present in a cell containing said gene, and said SSRMs correspond to the target RNA; and wherein said gene is endogenous to an organism selected from the group consisting of a plant, a mammal, an avian organism, a reptile, an insect, and a protozoan, or said target RNA is generated by a pathogen, whereby said gene is silenced.
2. The method of claim 1, wherein the cells are contained in an organism and said introducing comprises administering said SRMs to the organism.
3. The method of claim 1, wherein the SRMs are synthetic.
4. The method of claim 1 wherein each SARM and each SRM consists of 25 nucleotides.
5. The method of claim 1 wherein each SARM and each SRM consists of 26 nucleotides.
6. The method of claim 1 wherein each SARM and each SRM consists of 27 nucleotides.
7. The method of claim 1 wherein each SARM and each SRM consists of 28 nucleotides.
8. The method of claim 1 wherein each SARM and each SRM consists of 29 nucleotides.
9. The method of claim 1 wherein each SARM and each SRM consists of 30 nucleotides.
10. A method of silencing a gene in cells which method comprises introducing into said cells at least one vector that, when introduced into said cells produces short antisense RNA molecules (SARMs) and isolated short sense RNA molecules (SSRMs), collectively short RNA molecules (SRMs), wherein the SSRMs and SARMs consist of 20-30 nucleotides; wherein said SARMs are complementary to, and can base pair with, a target RNA, which target RNA is transcribed from a gene that is silenced when said SRMs are present in a cell containing said gene, and said SSRMs correspond to the target RNA; and wherein said gene is endogenous to an organism selected from the group consisting of a plant, a mammal, an avian organism, a reptile, an insect, and a protozoan, or said target RNA is generated by a pathogen, whereby said gene is silenced.
11. The method of claim 10, wherein the cells are contained in an organism and said introducing comprises administering said vector to the organism.
12. The method of claim 10 wherein each SARM and each SSRM consists of 25 nucleotides.
13. The method of claim 10 wherein each SARM and each SSRM consists of 26 nucleotides.
14. The method of claim 10 wherein each SARM and each SSRM consists of 27 nucleotides.
15. The method of claim 10 wherein each SARM and each SSRM consists of 28 nucleotides.
16. The method of claim 10 wherein each SARM and each SSRM consists of 29 nucleotides.
17. The method of claim 10 wherein each SARM and each SSRM consists of 30 nucleotides.