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Studying antisense copies of rice genes

Background: Recent studies have shown that over 10,000 genes rice genes are transcribed in the antisense as well as the sense direction; i.e. the plants made RNA copies of the non-coding strand. Antisense RNA can bind to the mRNA made from the same gene and prevent it from being translated, or the double stranded molecule can be processed to form small interfering RNAs, which have been shown to regulate many processes in a variety of organisms. Accordingly, the structure and function of these antisense molecules studies needs to be determined.

Experimental: We will test the hypothesis that antisense molecules help control the expression of light-regulated genes. We will first design primers to detect the presence of specific antisense transcripts to known light-regulated genes using bioinformatics approaches. We will then use these primers to probe RNA samples extracted from rice grown 10 days in either continuous light or continuous dark by reverse transcription followed by PCR. If antisense is detected we will then test whether its abundance varies in rice seedlings subjected to different light treatments. RNA molecules shown to differ between treatments will then be used as probes on Northern blots to confirm their differential expression. If warranted, we will then use techniques to clone the 5' and 3' ends of these molecules in order to determine their DNA sequence.