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Revisiting Mendel and the Paradox of Gene Restoration

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According to the laws of classical Mendelian genetics, genetic information contained in the nuclear genome is stably inherited and is transmitted from one generation to the next in a predictable manner. Several exceptions to the principle of stable inheritance are known but all represent specialized cases where the mechanisms have been relatively well defined. We have recently demonstrated that *Arabidopsis* plants can inherit specific DNA sequence information that was not present in the chromosomal genome of their parents. This process appears to occur throughout the nuclear genome. Based on our findings we propose that this process represents a completely novel and hitherto unknown mechanism for the maintenance and inheritance of DNA sequence information.