

*Plant and Animal Genome XX
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Epigenetic regulation of flower development in the oil palm

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Why studying the oil palm at all?

- **Because it is the 1st world source of vegetable oil and consumption for food and energy can only rise with increasing population.**
- **Because its *mantled* floral phenotype provide an original model where agro-economical interests fuel the search for basic knowledge in a tropical perennial.**

Characteristics of the *mantled* phenotype



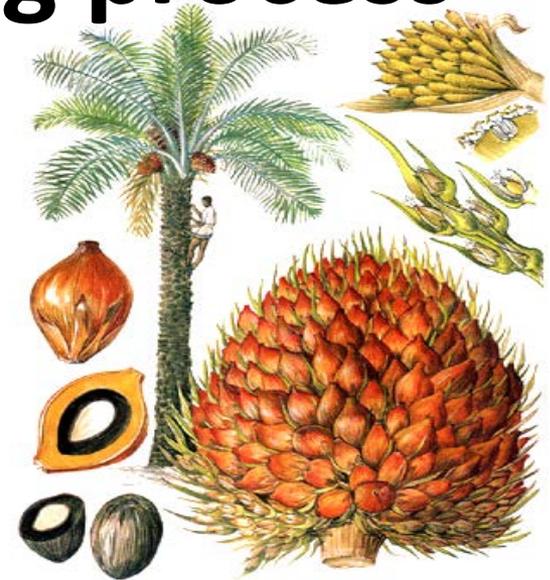
- Somaclonal variation: arises from *in vitro* cloning
- Alteration of floral organs:
poor oil accumulation, infertility, visible in adult trees only
- Highly heterogeneous: frequency, severity, genotype effect
- Unstable: spontaneous reversion

Dealing with *mantledness* from both ends of the cloning process



Embryogenic cell culture

Somatic embryogenesis



Adult regenerant palm

- Working on adult palms to understand the molecular origin of the floral phenotype
- Working on *in vitro* cultures to test potential markers for early detection

A few things we know about *mantled*

- No genetic/cytologic alteration
- Non-mendelian inheritance
- Hypomethylated genome



-19.3%



-7.4%

- Altered gene transcription
- Phenotype: stamen converted into carpels, reminiscent of B-class MADS-box gene mutants



Wildtype



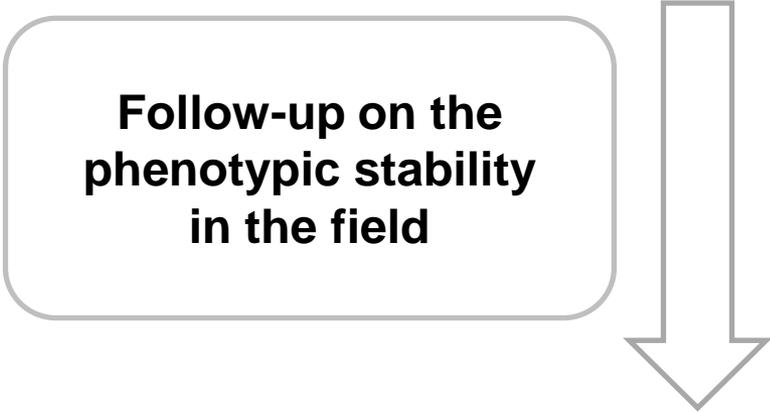
B mutant

The hypothesis

- **Epigenetic mechanisms regulating gene expression are perturbed by the cloning process (hormones, re-programming)**
- **Most of these alterations have no detectable impact on the phenotype and/or subside**
- **The pathway governing floral organ formation remains affected in the adult stage (sensitivity shared amongst Palms?)**

The strategy

- ***In vitro* material: investigating the genomic and epigenetic stability during the tissue culture process**

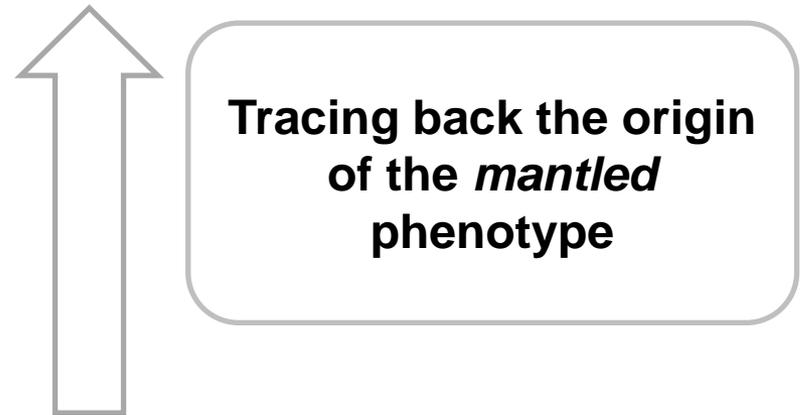


Follow-up on the
phenotypic stability
in the field

- **Adult (inflorescence) material: exploring the epigenetic regulation of flower development**

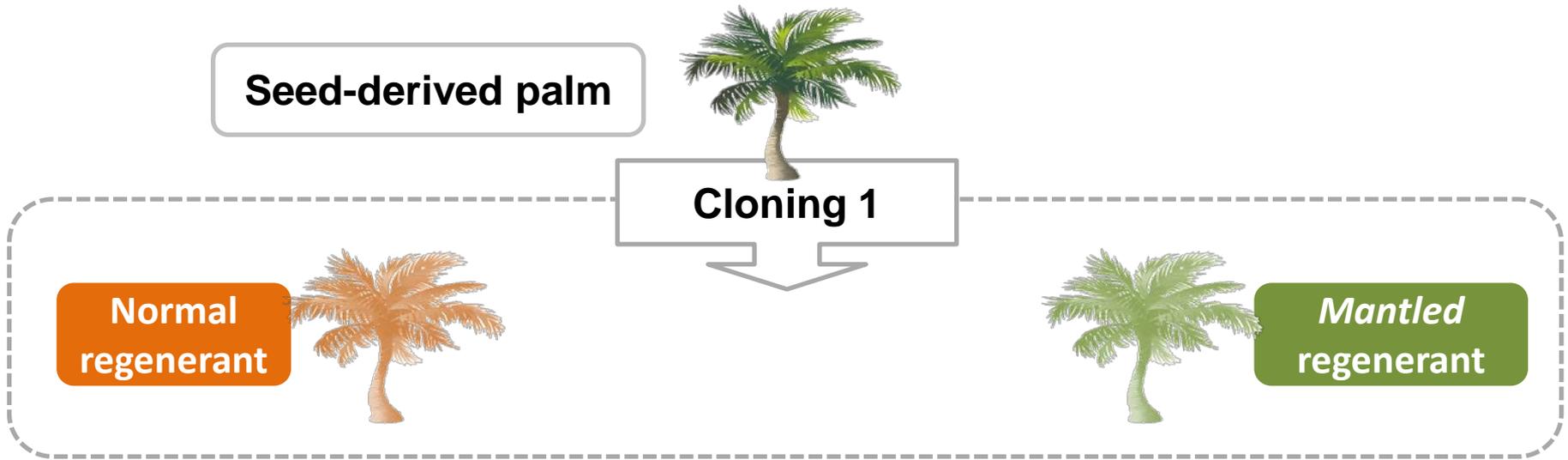
The strategy

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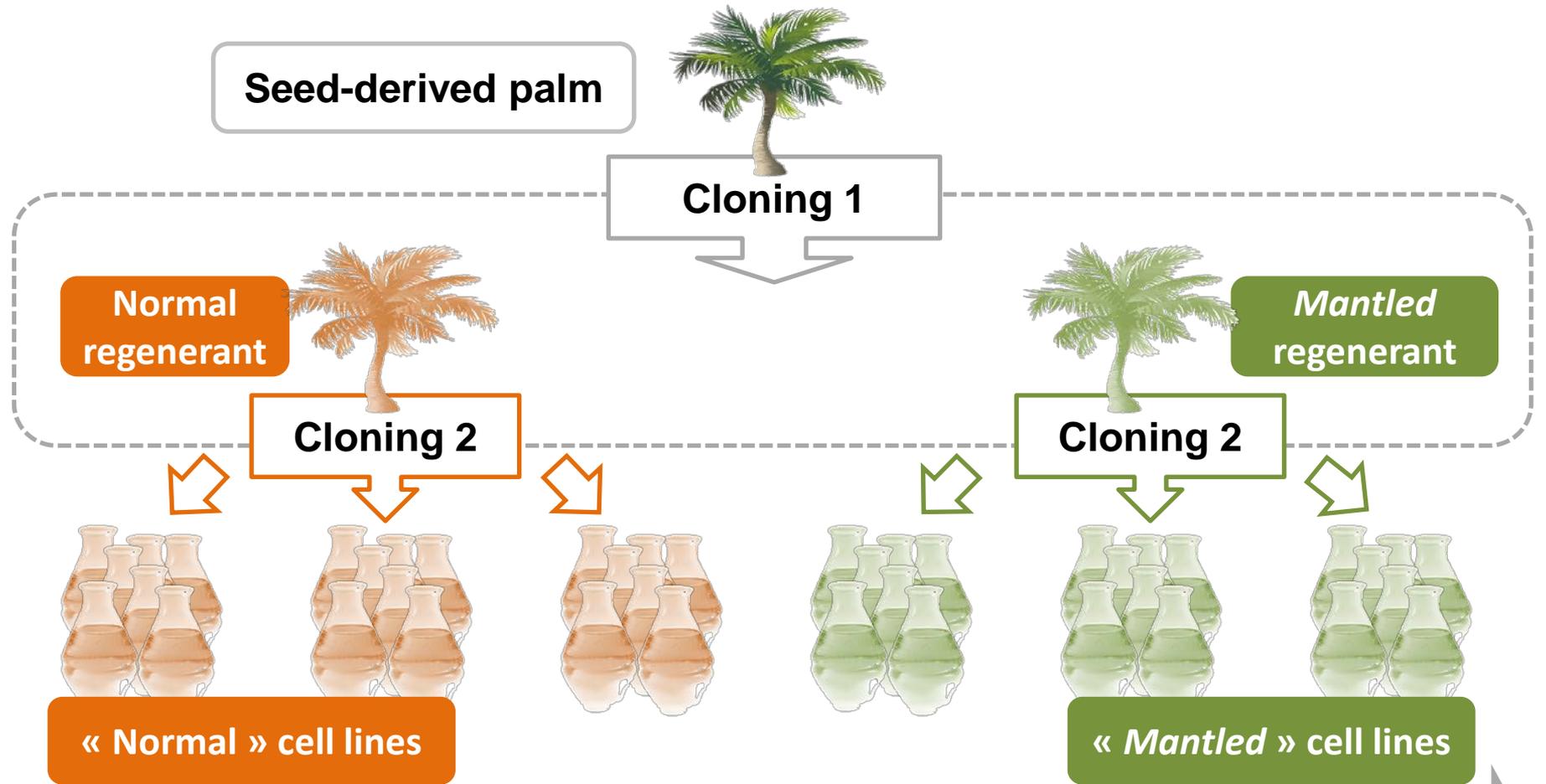


- **Adult (inflorescence) material:
exploring the epigenetic regulation of
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Investigating the stability of cell cultures

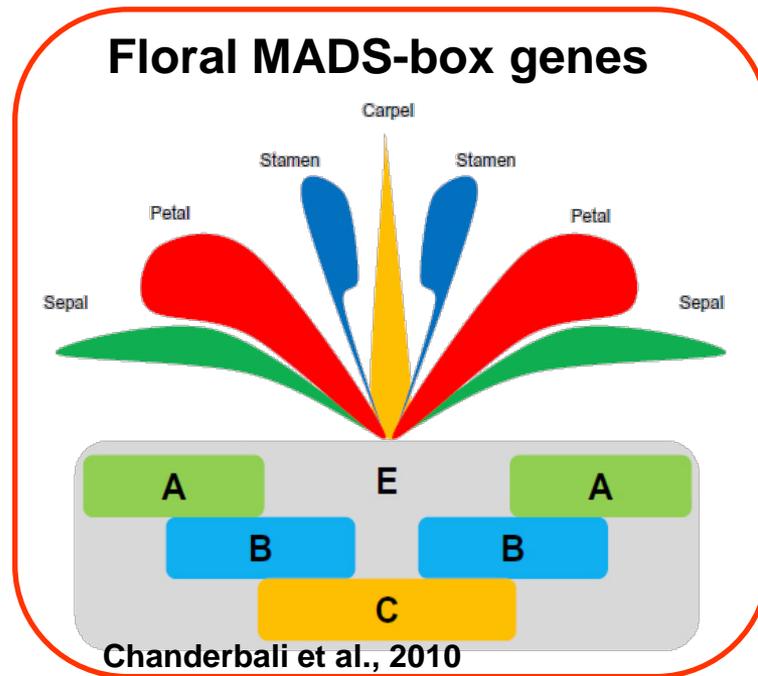


Investigating the stability of cell cultures

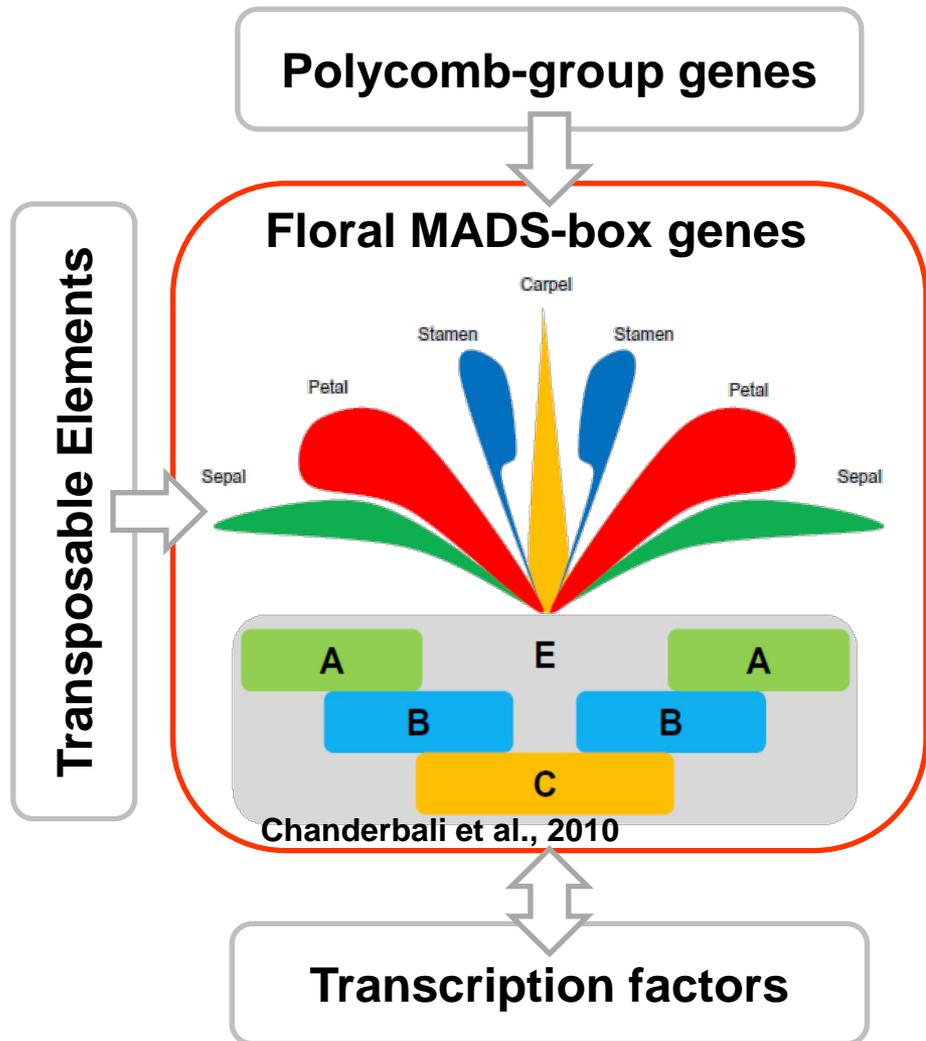


Propagation over 1 year, periodical samplings for DNA/RNA extractions

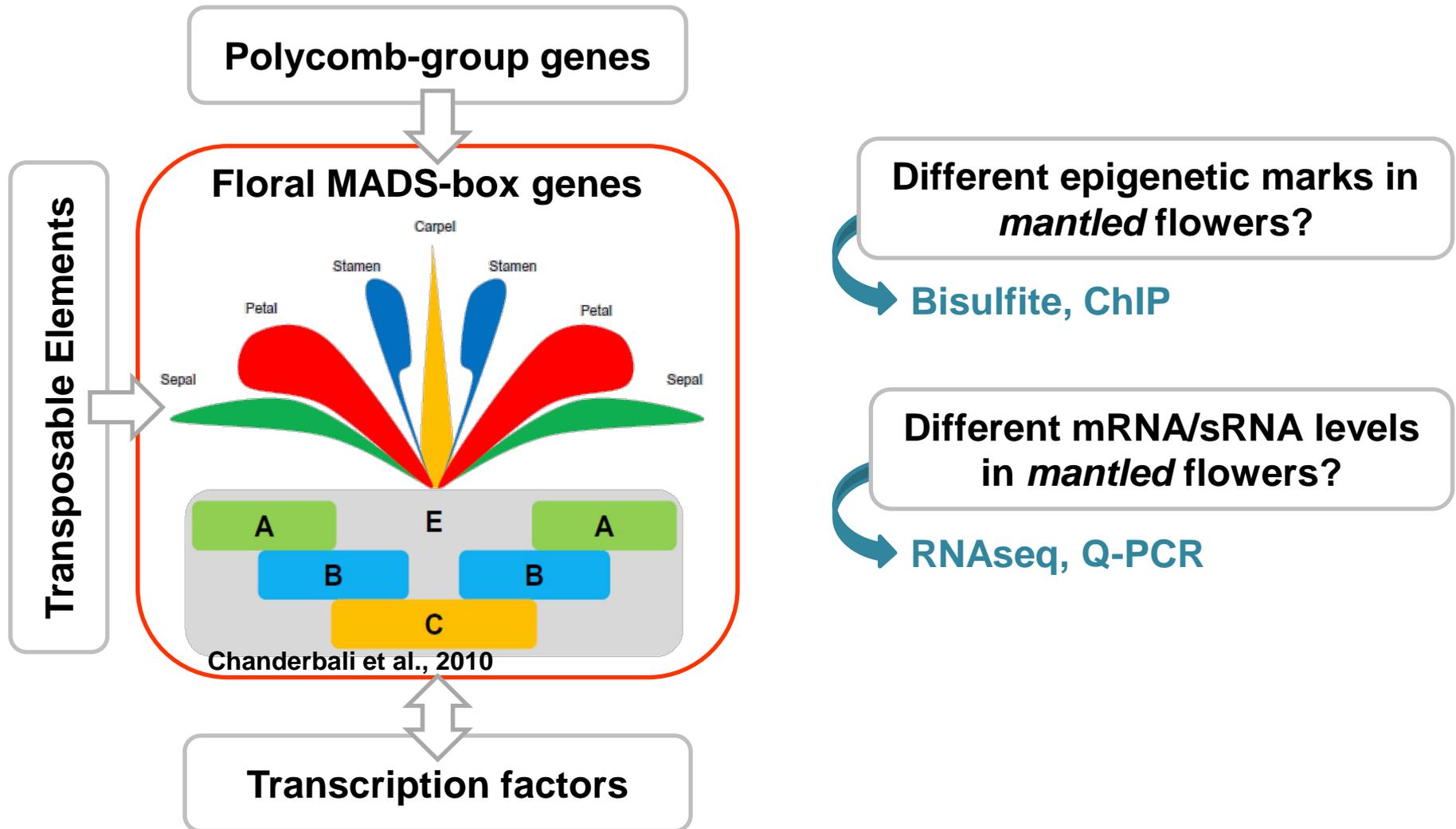
Exploring the epigenetic regulation of flower development



Exploring the epigenetic regulation of flower development



Exploring the epigenetic regulation of flower development



**« Things written in pen you can't change. That's DNA.
But things written in pencil you can. That's epigenetics »**

Danielle Reed, geneticist
National Geographic, January 2012 issue

Thank you for your attention

