



Universiteit
Leiden
The Netherlands

The evolution of chemical diversity in plants : pyrrolizidine alkaloids and cytochrome P450s in *Jacobaea*

Chen, Y.

Citation

Chen, Y. (2020, January 29). *The evolution of chemical diversity in plants : pyrrolizidine alkaloids and cytochrome P450s in Jacobaea*. Retrieved from <https://hdl.handle.net/1887/83487>

Version: Publisher's Version

License: [Licence agreement concerning inclusion of doctoral thesis in the Institutional Repository of the University of Leiden](#)

Downloaded from: <https://hdl.handle.net/1887/83487>

Note: To cite this publication please use the final published version (if applicable).

Cover Page



Universiteit Leiden



The handle <http://hdl.handle.net/1887/83487> holds various files of this Leiden University dissertation.

Author: Chen, Y.

Title: The evolution of chemical diversity in plants : pyrrolizidine alkaloids and cytochrome P450s in *Jacobaea*

Issue Date: 2020-01-29

Stellingen (Propositions)

behorende bij het proefschrift van Yangan Chen

The evolution of chemical diversity in plants:

pyrrolizidine alkaloids and cytochrome P450s in *Jacobaea*

1. Pyrrolizidine alkaloid (PA) diversity in *Jacobaea* species is species-specific and PA diversity lacks a phylogenetic signal suggesting a fast evolution of new PA bouquets. (this thesis, Chapter 2)
2. The evolution of cytochrome 450 monooxygenases (CYPs) has been very fast, showing strong lineage specific expansion within the Asteraceae family. (this thesis, Chapter 3)
3. A gene-to-metabolite approach targeting genes for the involvement in PA biosynthesis is still challenging due to limited biosynthetic information. (this thesis)
4. PAs of *Jacobaea* species provide good study systems to study the secondary metabolite (SM) diversity from ecological, evolutionary and biosynthetic perspectives. (this thesis)
5. Understanding the mechanisms behind SM diversity is essential for developing resistant varieties of our crops.
6. The ecological importance of the large inter- and intraspecific SM diversity is still poorly understood and in particular it would be interesting to gain more insight in the role that specialist herbivores of one plant species play in negative selection pressure on the production of particular SMs in other neighboring species.
7. Fast tinkering of the metabolite structures within a class of SMs is possible because it involves relatively simple conversions by enzymes encoded by genes belonging to large gene families such as CYPs that readily evolve.
Kessler and Kalske (2018) Annual Review Ecology, Evolution, and Systematics 49:115-138.
Bak et al. (2006) Phytochemistry Reviews 5:309-329.
Frey et al. (2009) Phytochemistry 70:1645-1651.
8. Because controlling the conditions in ecological experiments is inherently difficult and by definition the act of controlling itself makes an experiment less ecologically relevant, statistical analyses are the key to high quality ecological sciences.
9. Excessive focus on avoiding mistakes will hamper true progress in science.
10. The Dutch work hierarchy is just as flat as the landscape.

January 29, 2020